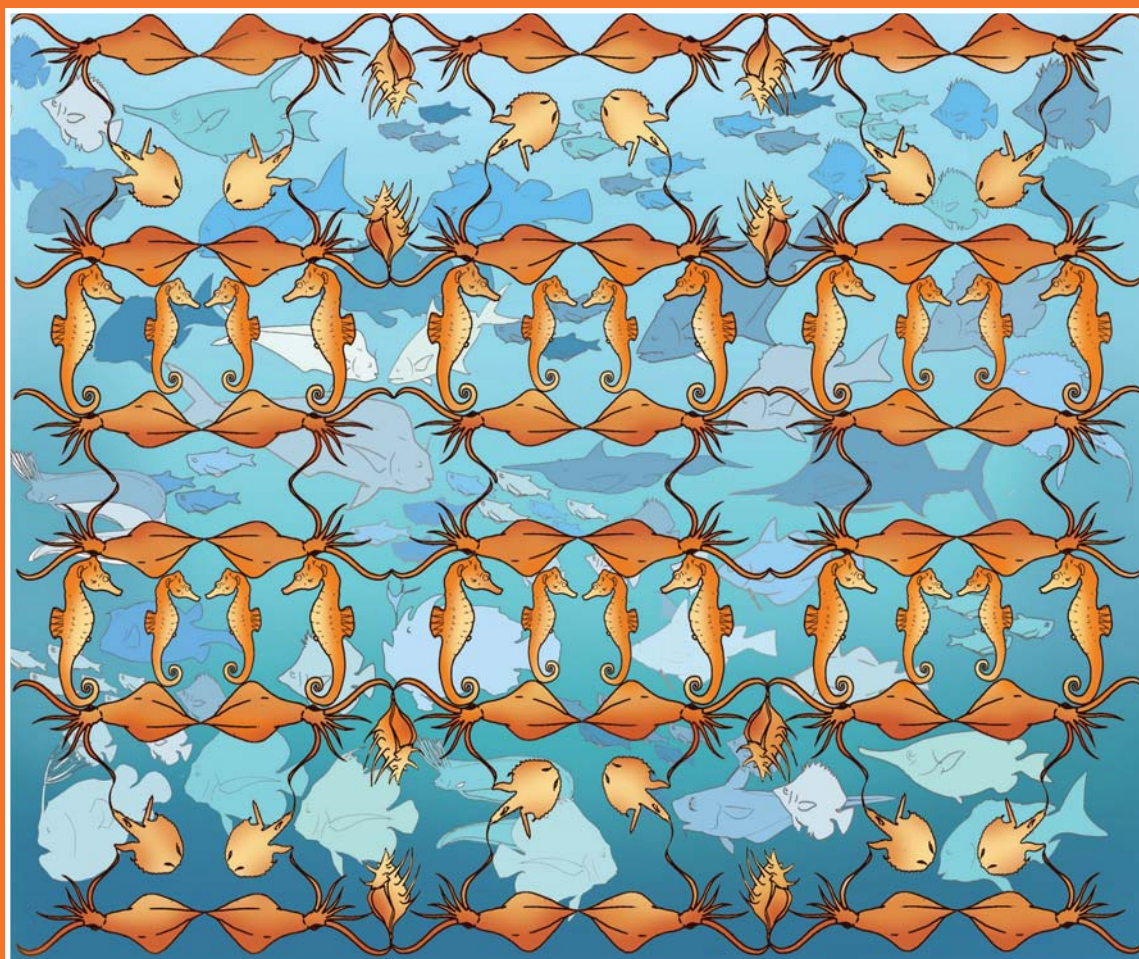


THE LIVING MARINE RESOURCES OF THE  
**EASTERN CENTRAL  
ATLANTIC**

Volume 1 Introduction, crustaceans, chitons  
and cephalopods





FAO SPECIES IDENTIFICATION GUIDE FOR FISHERY PURPOSES

**THE LIVING MARINE RESOURCES OF THE  
EASTERN CENTRAL ATLANTIC**

**VOLUME 1**

**Introduction, crustaceans, chitons, and cephalopods**

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*The living marine resources of the Eastern Central Atlantic. Volume 1: Introduction, crustaceans, chitons, and cephalopods.*

FAO Species Identification Guide for Fishery Purposes, Rome, FAO. pp. 1–663.

### **SUMMARY**

This multivolume field guide covers the species of interest to fisheries of the major marine resource groups exploited in the Eastern Central Atlantic. The area of coverage includes FAO fishing area 34 and part of 47. The marine resource groups included are bivalves, gastropods, chitons, cephalopods, stomatopods, shrimps, lobsters, crabs, hagfishes, sharks, batoid fishes, chimaeras, bony fishes and sea turtles. The introductory chapter outlines the environmental, ecological, and biogeographical factors influencing the marine biota, and the basic components of the fisheries in the Eastern Central Atlantic. Within the field guide, the sections on the resource groups are arranged phylogenetically according to higher taxonomic levels such as class, order, and family. Each resource group is introduced by general remarks on the group, an illustrated section on technical terms and measurements, and a key or guide to orders or families. Each family generally has an account summarizing family diagnostic characters, biological and fisheries information, notes on similar families occurring in the area, a key to species, a checklist of species, and a short list of relevant literature. Families that are less important to fisheries include an abbreviated family account and no detailed species information. Species in the important families are treated in detail (arranged alphabetically by genus and species) and include the species name, frequent synonyms and names of similar species, an illustration, FAO common name(s), diagnostic characters, biology and fisheries information, notes on geographical distribution, and a distribution map. For less important species, abbreviated accounts are used. Generally, this includes the species name, FAO common name(s), an illustration, a distribution map, and notes on biology, fisheries, and distribution. Each volume concludes with its own index of scientific and common names.

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## Editorial Notes

### Geographical Limits

The area covered includes the Eastern Central Atlantic region in its entirety, comprising the Fishing Area 34 as well as the northern part of Fishing Area 47. This includes all of the marine and estuarine areas of western Africa from Gibraltar to the middle part of Namibia from 36° 00' N to 23° 00' S latitudes and all estuaries, seas, and oceans westward to 30° 00' W longitude off FAO fishing area 34 and westward to 20° 00' W longitude off FAO fishing area 47.

### Project Institutional Affiliations

This identification guide was prepared under the direction of the Species Identification and Data Programme – SIDP (now named FishFinder) of the Marine and Inland Fisheries Branch, Fisheries and Aquaculture Department, Food and Agriculture Organization of the United Nations (FAO), Rome, Italy. Project support came from the Ministry of Foreign Affairs of the Kingdom of Norway to the FAO Global Partnerships for Responsible Fisheries (FISCHCODE). A workshop to edit and test the taxonomic accuracy of the fish chapters was held in Tenerife at the “Instituto Español de Oceanografía” in July 2004. Workshop support came from the Government of Spain and from the Norwegian Agency for Development Cooperation (Norad).

The final production of this regional guide was funded by the EAF-Nansen Project “*Strengthening the Knowledge Base for and Implementing an Ecosystem Approach to Marine Fisheries in Developing Countries*”.

### Objectives

The purpose of this guide is to provide an accurate means to identify to the appropriate taxonomic level those organisms that are of potential use or likely to be captured by marine fisheries in the region. Correct identification is of utmost importance in marine resource management. The quality of fisheries statistics depends on the ability to correctly assign landing and catch data to taxon-specific categories. The species name is the link to all relevant biological and ecological information in the literature. This information is fundamental in any attempt to manage a fishery. Correct identification is also important for those scientists gathering biological data relevant to marine resource management. The fishery manager cannot confidently use the relevant biological data if the scientist collecting this information did not have an accurate means of identifying the species to begin with. Therefore, this identification tool will benefit fisheries workers gathering catch statistics and resource assessment information, and marine biologists researching information pertinent to resource management. This is particularly important for the ECA area because it encompasses the highest diversity of marine organisms exploited by fisheries in the Atlantic Ocean.

An additional objective of this guide is to document whenever possible the extent of the biodiversity likely to be affected by fisheries. Many of the questions regarding exploitation of resources are linked to issues of biodiversity because of potential adverse environmental effects of fisheries. Therefore, in important groups where it is feasible, as in the finfishes, an attempt has been made to list all species present in all families recorded from the ECA area.

### History of the Project

In 1981, Walter Fischer, the founder and senior editor of the SIDP, produced the FAO Species Identification Sheets for Fishery Purposes, Eastern Central Atlantic Fishing Areas 34, 47 (in part). This guide has been very useful in the region for fishery surveys, fisheries research, resource assessment and fisheries management. Since its completion, however, there have been numerous improvements in the taxonomy of the marine resources in the region and a main purpose for this project was to incorporate these changes into a new edition.

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## FAO and AFS/ASIH Common Names

Some official common names for finfishes differ between the FAO and those of the joint committee of the American Fisheries Society (AFS) and American Society of Ichthyologists and Herpetologists (ASIH). In order to allow cross reference between these 2 widely used systems, whenever the English common name differs substantially, the AFS/ASIH English common name, as in the manuscript for the sixth edition planned for publication in 2003, is listed in parentheses after the FAO common name. To simplify, small differences between the English names, such as a space or hyphen between compound words, or an 'ed' ending are not noted. No attempt was made to note differences between official Spanish FAO and AFS/ASIH names since this part of the AFS/ASIH list is not yet complete.

## Finfish Scientific Names and Eschmeyer's *Catalog of Fishes*

W.N. Eschmeyer has tirelessly researched the scientific names of finfishes and his species and genera database is found in the California Academy of Sciences publication, the *Catalog of Fishes*, which is also available online. The spelling and citation of all scientific names follows this database unless an author specifically disagreed with a listing.

## Different Levels of Taxonomic Coverage

In addition to the great diversity of species covered in this guide, there is also a wide diversity in the extent and methods of fisheries utilization. We attempt to give more extensive coverage to those species that are more important in fisheries. However, it is also often difficult to judge how fisheries importance will change with time, and whether an organism has potential for exploitation. In addition, exploitation must be carefully weighed against ecological impacts in order to ensure sustainability. Included in this consideration is the issue of biodiversity. Ideally, this document would include a comprehensive list of all species in the groups covered so that it can also be used as a benchmark for biodiversity. However, for many of the invertebrate groups which are very speciose, the work required to compile species lists is beyond the scope of this work. However, for the vertebrate groups, comprehensive species lists were possible and are included here.

The families most important in fisheries are covered with a family section summarizing family diagnostic characters, biological and fisheries information, notes on similar families occurring in the area, a key to species, a list of species, and a short list of relevant literature. However, for certain groups, family accounts are omitted and extensive information is included only under the species accounts. Species in the important families have a single side of a page to include the species name, frequently encountered synonyms (or combinations) and misidentifications, the FAO common name or names, an illustration, diagnostic characters, biology and fisheries information, notes on geographical distribution, and a map showing a generalized area of coverage. For less important species, abbreviated accounts are used. This includes the species name, FAO common name or names, notes on biology and distribution, an illustration, and a generalized distribution map. Families which are monotypic or contain a single species in the area are covered similar to important species except that frequently 2 sides of a page are used and notes on similar species occurring in the area are included. Families that are less important have a family section similar to those for important families except a key to species may or may not be included, and no detailed species pages follow. For finfish, the maximum size and a brief distribution description are included for those species in a list of species not additionally covered in a species account.

## Sizes Reported

All sizes listed are the total lengths unless otherwise specified.

## The Distribution Maps

The maps included for species of importance to fisheries are generalized maps with a total expected range. This masks the complexity of distribution of many species since the actual records of occurrence are not shown. Points in between geographical limits are included in many maps and this gives the impression that species may also be found in inappropriate habitats. Obviously, however, a fish normally

found on a coral reef is not expected to occur in the intervening open ocean indicated on the generalized map. These maps should be used to give a quick indication of the known or expected limits of geographical limits of occurrence, rather than as an absolute indication of occurrence.

Distribution maps were digitized and collated into a geographical information system at Old Dominion University, Norfolk, Virginia, USA. (A.R. Mahon and J.C. Sanciangco, Old Dominion University).

## Peer Review and Citations

Each separate finfish family was reviewed by a minimum of 2 peer reviewers and therefore can be considered a peer review publication. When citing a specific taxonomic work, the author or authors should be listed first. For example:

**Fransen, C.H.J.M.** 2014. Shrimps and Prawns. In K.E. Carpenter & N. De Angelis, eds. *The living marine resources of the Eastern Central Atlantic. Vol. 1: Introduction, crustaceans, chitons and cephalopods.* FAO Species Identification Guide for Fishery Purposes. Rome, FAO. pp. 37–196.

## When citing this work in its entirety the editors should be listed first:

**Carpenter, K.E. & N. De Angelis, eds.** 2014. *The living marine resources of the Eastern Central Atlantic.* FAO Species Identification Guide for Fishery Purposes, 4 Vols. Rome, FAO.

## The Tenerife Workshop

The Tenerife workshop participants included project staff, identification key testers, authors, and experts who reviewed manuscripts and worked with testers during identification exercises. The objective of testing the identification keys using both fresh and preserved specimens was to improve the usefulness of the keys for those fishery workers that are likely to use these keys. The authors interacted with testers during these exercises in order to gain feedback on ways to make the identification guide more efficient and easier to use for fishery workers.

Special thanks are due to M. Lamboeuf and J. Lleonart who worked tirelessly as project coordinators before and during the workshop. An important element for making the workshop effective was the collection of specimens that were used during tests of identification keys. IEO staff did an excellent job collecting these specimens prior to and during the workshop. E. Balguerías Guerra deserves special thanks for helping to curate and manage the specimens in a database. The editors thank all those who participated and helped:

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The scientific illustrator for these volumes was E. D'Antoni who rendered most of the illustrations appearing here for the first time. The following authors provided part of the original illustrations: C.H.J.M. Fransen (Shrimps and Prawns, True crabs), J.M. Poutiers (Bivalves, Gastropods), A. Guerra (Cephalopods).

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# Oceanography, Geology, Biogeography, and Fisheries of the Eastern Central Atlantic

by Merete Tandstad<sup>1</sup>, Ana Maria Caramelo<sup>2</sup>, Fabio Carocci<sup>1</sup>, Kent Carpenter<sup>3</sup> and Jonnell C Sanciangco<sup>3</sup>

## Introduction

This species identification guide focuses on the marine species occurring in the eastern Atlantic Ocean from Gibraltar in the north (36°00'N) to the middle of Namibia in the south (23°00'S), and westward to 30°00'W longitude (FAO Fishing Area 34) and to 20°00'W longitude (FAO Fishing Area 47) (Fig. 1). Estuarine species, as well as species that only spend part of their life cycle in marine waters (anadromous and catadromous species) are also included.

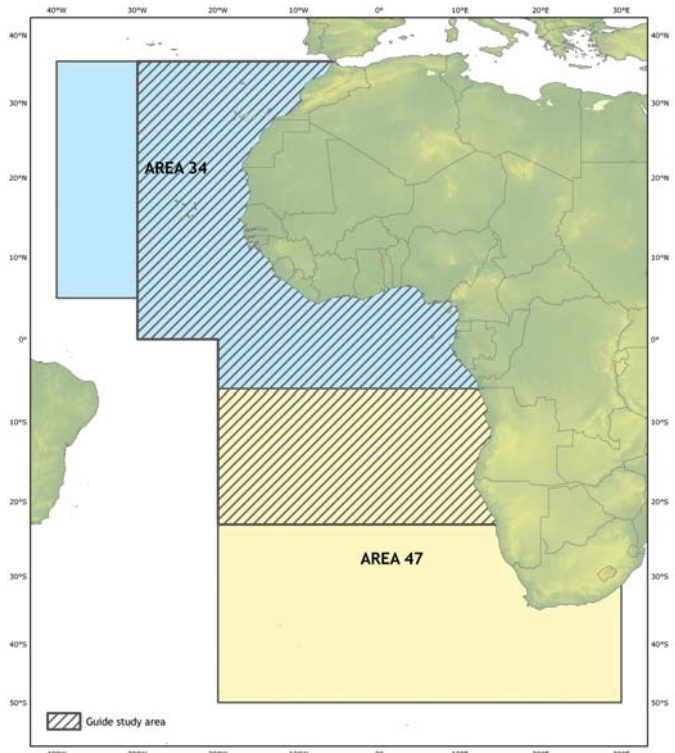
The West African coast encompasses some of the most productive areas in the world, supporting important fishery resources and a unique diversity. Fisheries constitute an important activity throughout the region and contribute to food security and economic revenue for the people and countries from Morocco in the north to Namibia in the south. The fisheries are of a diverse nature and the type of fishing craft used ranges from small scale dug-out canoes, through larger motorized canoes and coastal fleets to large industrial vessels. Some of the area covered by this guide encompasses the greatest diversity of marine organisms exploited by fisheries in the eastern Atlantic Ocean.

The area covered is also diverse culturally, politically, and geographically, with many distinct marine regions and several islands and island groups.

With many jurisdictional units it becomes clear that the countries of the region are faced with the challenge of management of shared stocks. Many of the main pelagic stocks and some of the demersal stocks are distributed across several EEZs. This has consequences for the management of the fisheries exploiting these resources and implies that agreements (bilateral, subregional, etc.) would need to be considered on a

case by case basis (FAO, 2009; Garcia *et al.*, 2010).

Industrial development in the coastal zone of these areas, as well as migration of people from inland rural areas to the coastal industrial centres, has led to increasing pressure on the coastal environment and habitat. Over the past 2 to 4 decades, marshes, swamps and mangroves have been degraded and lost through natural factors such as drought, but also through human activities such as unsustainable agricultural practices, urbanization, mining and other industries and modification of rivers that has reduced water supply



**Fig. 1** Area covered by this guide

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to wetlands and marine areas (Heileman and Tandstad, 2008). Overexploitation of natural resources is also a fundamental problem in many areas (FAO, 2008).

### Purpose of this Guide

The purpose of this guide is to provide an accurate tool to identify, to the appropriate taxonomic level, those organisms that are of potential use or likely to be captured by marine fisheries in the region. The species included are those considered to be of present or potential interest to fisheries, or those that may be important in fisheries production or to fisheries management in general.

It is hoped that this identification tool will benefit fisheries workers gathering catch statistics and resource assessment information, marine or fishery biologists researching information pertinent to resource management as well as the fisheries administrations responsible for managing the fisheries targeting these resources.

An additional objective of this guide is to provide a tool that can be used to help documenting the diversity of marine macrofauna in the region. This is important also in relation to understanding the extent of the biodiversity likely to be affected by fisheries. Therefore, this guide is comprehensive and also includes, to the extent possible, species that are not commercially important.

This guide expands upon and updates the FAO Species Identification Sheets for Fishery Purposes for the Eastern Central Atlantic (Fischer *et al.*, 1981). All species accounts with distribution maps have

been revised and updated, and new species have been added, expanding the coverage from 681 to 747 species. This guide is the geographic complement to the FAO Identification Guide to the Western Central Atlantic (Carpenter, 2002) and together, the 2 guides provide coverage of subtropical and tropical marine species across the Central Atlantic Ocean.

### Geology and Geomorphology

The western side of the African Plate dominates the geology of the eastern Atlantic (Fig. 2). Specifically this area includes the area bordered to the north by the Azores-Gibraltar ridge, to the west by the mid-Atlantic ridge and to the south by the Walvis ridge and Cape basin.

The rupture of the Gondwana continent in Mesozoic time and the gradual opening of the Atlantic and Indian Oceans at the expense of the Tethys Sea shaped the African plate. This was followed by the Cenozoic opening of the Red Sea seafloor spreading along the mid-Atlantic ridge. This caused the separation of South America from Africa, a process which lasted over a period of 100 Ma, from early Jurassic to middle Cretaceous (Schwartz, 2005).

The principal feature of the bottom topography of the Atlantic Ocean is the mid-Atlantic ridge, a submarine mountain chain that extends from Iceland in the north to approximately 58° south latitude. The mid-Atlantic ridge separates the Atlantic Ocean in two and transverse ridges running between the continents and the mid-Atlantic ridge divide the ocean floor into numerous basins.

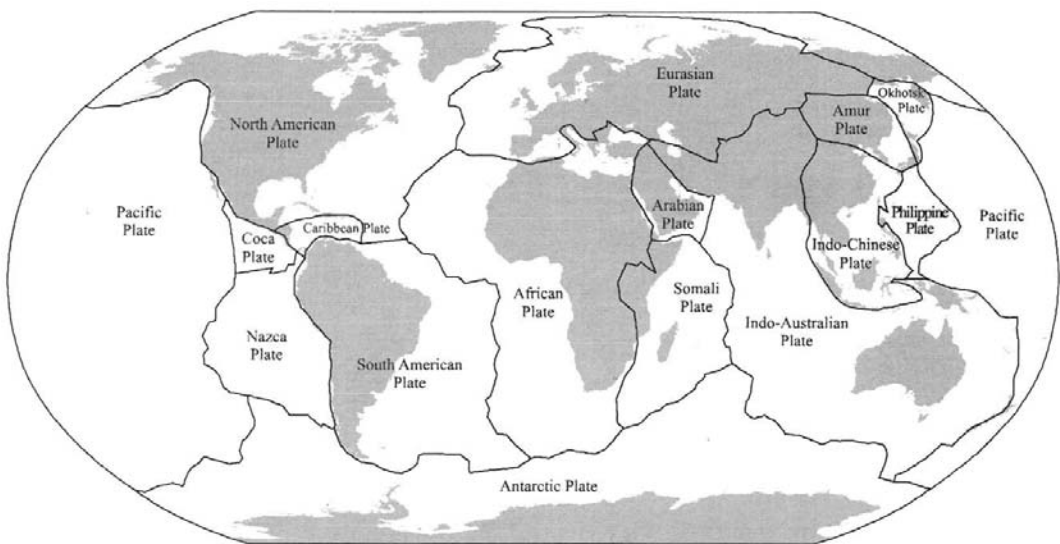


Fig. 2 Major lithosphere plates of the world (source: Carpenter, 2002)

To the east of the mid-Atlantic ridge lie a number of large basins of relatively even profile, interrupted by extended ridge systems (Schwartz, 2005). To the north of the eastern central Atlantic region the larger basins include the Cape Verde and Canaries basins whereas the largest south Atlantic basins are the Angola and Cape basins. The latter basins are separated by a submarine mountain chain, the Walvis ridge, which runs from the continental shelf at latitude 20°S (northern Namibia) in a southwesterly direction for more than 2 500 km towards the mid Atlantic ridge (Fig. 3).

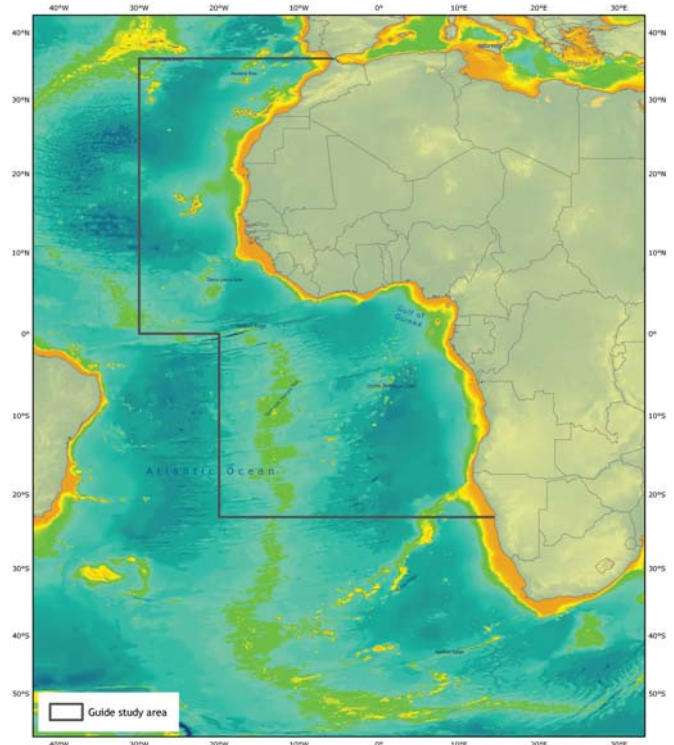
The basins are abyssal plains filled by mud of organic calcareous origin and red clay; and the ridges are rocky abyssal hills. Large ancient volcanoes are found in isolation or in rows and rise to form seamounts and islands (Schwartz, 2005). This system of basins and ridges influence the circulation of deeper waters off the eastern central Atlantic.

## Coastal Features and Shelf Topography

The Atlantic coast of Africa may be divided into three main zones: the coast from Cape Spartel (Morocco) to Cape Vert (Senegal) influenced by the cool Canary Current; the humid tropical coast from Cape Vert to beyond the Congo River, dominated by the Guinea Current; and the coast from Angola to the Cape of Good Hope characterized by the cool Benguela Current.

One coastal feature of particular interest are the mangroves that are found along the tropical parts of the West African coast, from Mauritania in the north to Angola in the south. Some 70% of all African mangroves can be found in just five countries (FAO, 2007), including Nigeria, Guinea and Cameroon on the Atlantic coast of Africa. Well developed mangroves can be found in large river deltas, in lagoons, along sheltered coastlines and on tidal flats (FAO, 2007). These mangroves are important nursery grounds for many fish and crustacean species.

Another important characteristic, influenced amongst others by the drainage of many major African rivers into the eastern central Atlantic (e.g. Cunene, Congo, Niger, Volta, Gambia, Casamance), are the large estuarine areas and coastal lagoons and the many wetlands that are of



**Fig. 3 Bottom topographical features of the eastern central Atlantic**

considerable value within their extensive delta systems. The lagoons in the Gulf of Guinea have developed into a dominant feature of the coastline and are important reservoirs for biological diversity (Ajao *et al.*, 2009).

The continental shelf along the coast of West Africa although variable in width and depth is in general narrow. The continental shelf in the CECAF region (Area 34) is typically between 40 and 55 km wide except in the area between latitudes 24°N and 20°N (Dakhla to Nouadhibou), and the area between Dakar (15°N) and Freetown (8°N) where the shelf is about 180 km wide (Brainerd, 1980). Off southern Angola and Namibia the continental shelf is narrow, being at its widest off the mouth of the Orange River and off Walvis Bay, and narrowest off the Cunene River to Cape Frio (Sakko, 1998 as referred to in Palomares and Pauly, 2004; Bianchi *et al.*, 1999).

Most of the western coast of Africa is dominated by terrigenous deposits, with the exception of a small region off Ghana and Côte d'Ivoire (Longhurst and Pauly, 1987).

## Oceanography

### Winds, Currents and Upwellings

Wind intensity and direction significantly influence the circulation of the surface water layers and the oceanography of the West African region, and subsequently also the productivity of the coastal waters. These factors act at various times and space scales ranging from region-wide seasonal changes to local events of short duration.

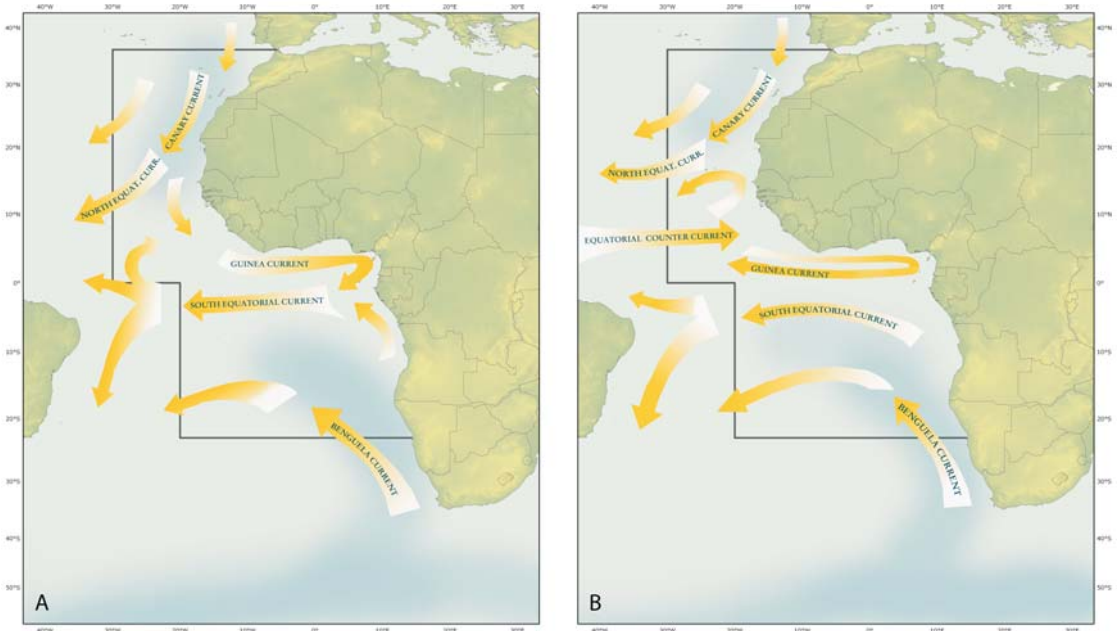
The coastal environment along the west coast of Africa is, however, not uniform, and this gives rise to regional differences in productivity and biodiversity. One unique feature of the West African coast is the presence of 2 of the world's 4 eastern boundary current systems, the Canary current and the Benguela current systems. Eastern ocean boundaries are often referred to as classical coastal upwelling regions (Bakun, 1996) and are characterized by upwelling of cold nutrient-rich water along the coast. These areas are important centres of plankton production which again supports important biodiversity and biomass of marine species particularly pelagic fish (Longhurst and Pauly, 1987; Bakun, 1996; Shannon and O'Toole, 1999).

The Canary Current branches south from the North Atlantic Current and flows along the African coast from north to south between 30°N and 10°N and offshore to 20°W (Fedoseev, 1970). At the level of Senegal the current moves away from the coast

and flows westwards joining the Equatorial Counter Current coming from the south (Fig. 4). The upwelling of cool, nutrient rich water along the northwest African coast is the result of alongshore wind forcing from the northeast trade winds, and vary with season and latitude (Wooster *et al.*, 1976).

In the Canary Current region major upwelling occurs between 23°N and 25°N and occurs year-round from Cap Blanc and northwards (FAO, 2009). South of Cap Blanc, upwelling is limited to winter and spring due to the northward migration of the Azores high during summer. The position and strength of the Azores anticyclone governs the wind and current system along the northwest African coast and subsequently the intensity and area of upwelling along the coast. The border between the northeast and southeast trade winds, the Intertropical Convergence Zone (ITCZ) is at its southernmost limit in January–February (around 5°N) leading to an expansion of the upwelling area in this period. In the period June–August the ITCZ is found further to the north and the limit of the upwelling area retreats northwards.

The Benguela Current flows parallel to the southwest African coast in a north to northwesterly direction from approximately Cape Point in the south until about 24°S where most of the current bends northwest. Streams of the Benguela current proceed northward along the shore and its northern limit corresponds to the frontal zone between the



**Fig. 4 Major surface currents in a) February and b) July**  
(adapted from Wauthy, 1983 as shown in Schneider, 1990)

Benguela and Angola current off southern Angola (17°S to 13°S) (Figs 4 and 5). (Moroshkhin *et al.*, 1970; Wedepohl *et al.*, 2000). The prevailing winds are responsible for strong Ekman transport and the resulting coastal upwelling of cool, nutrient-rich water that stimulates primary productivity that sustains large zooplankton production and pelagic fish stocks.

The coastal upwelling area of the Benguela current ecosystem extends from the Cape in South Africa, northwards along the coast of Namibia and into southern Angola (Shannon and O'Toole, 1999). The intensity is not uniform in space and time because of short term and seasonal differences in the wind regime and differences in coastline and shelf topography (Bianchi *et al.*, 1999). Major centres of upwelling in the Benguela include Cape Frio (northern Namibia), off Luderitz in southern Namibia and off the western cape (South Africa), the first of which is included in the area covered by this guide.

The circulation patterns of the waters of the Gulf of Guinea are influenced by both the Canary and Benguela currents and also by the south Equatorial and Guinea Currents (Fig. 4). The latter flows eastwards from Senegal to the Bight of Biafra and is fed by the Equatorial Counter current and a branch of the Canary Current (Schneider, 1990). While the northern border of the Guinea Current is distinct, but with seasonal fluctuations, its southern boundary is less well-defined (Binet and Marchal, 1993). The westward flowing South Equatorial current originates between Cape Lopez (Gabon) and 18°S (Angola) and influences the waters off the Southern Gulf of Guinea.

The Guinea Current is also characterized by areas of upwelling and increased biological productivity, although the processes leading to these upwellings differs from those observed in the eastern boundary systems and the Guinea Current is unusual among upwelling regions in that there seems to be no correlation between sea surface temperature and wind patterns on a seasonal time scale (Longhurst, 1962; Bakun, 1978). According to Voituriez and Herbland (1982) seasonal upwelling in this region is not induced by local wind stress. It has been suggested that this upwelling is rather created by geostrophic adjustment of isotherms (Ingham,



**Fig. 5 Major surface currents in the Benguela**

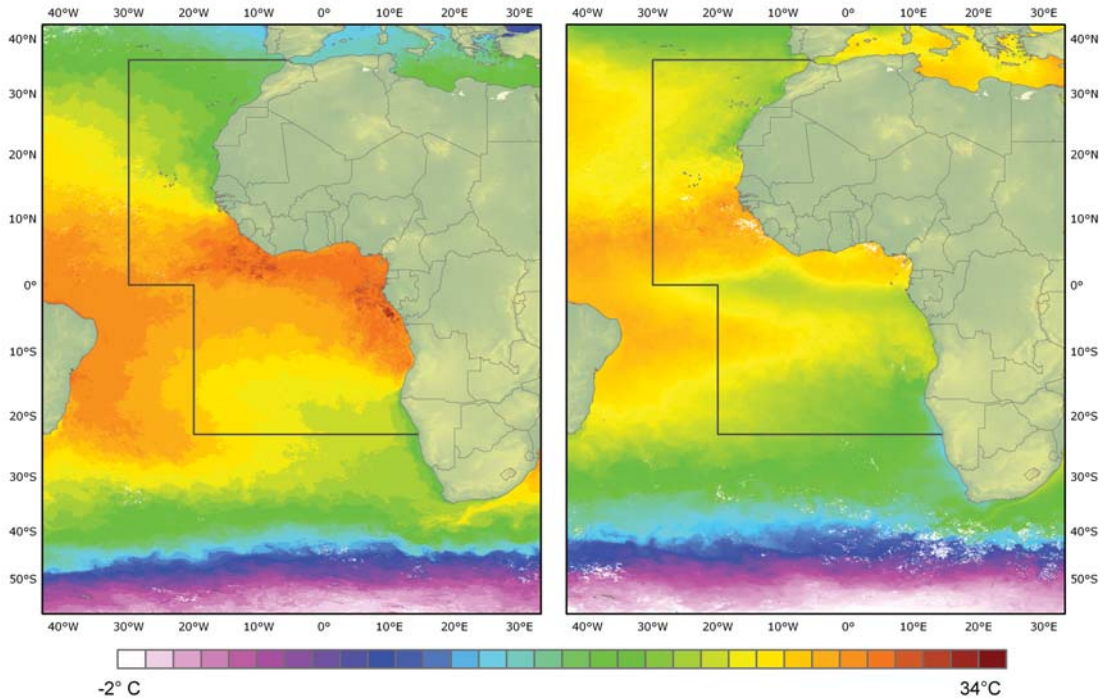
1970), Kelvin waves (Picaut, 1983; Verstraete, 1992), and cyclonic turbulent eddies (Marchal and Picaut, 1977).

The main upwelling region of the Gulf of Guinea extends from the coast of Côte d'Ivoire to Ghana. The upwelling off the coasts of Ghana and Côte d'Ivoire is seasonal, with intense upwelling from July to September weakening from about January to March (Bakun, 1978; Roy, 1995). Another area of upwelling is located off Congo and Gabon where the raising of the thermocline, cooling of surface water and increased primary production has been interpreted as a sign of upwelling.

Figure 6 illustrates regional differences and seasonal changes in sea surface temperatures along the west African coast in 2009 showing higher temperatures in the Gulf of Guinea area in January and the relatively cooler waters in July.

## Biogeography

The west coast of Africa encompasses temperate, tropical and subtropical eastern Atlantic marine biogeographic regions. The different physical and oceanographic features, along the



**Fig. 6 Mean sea surface temperatures (SST) for 2009 in a) January and b) July**

[source: Images on Sea Surface Temperature obtained from site <http://podaac.jpl.nasa.gov> maintained by the NASA JPL Physical Oceanography DAAC, Pasadena, CA (2010)].

coast influence the nature of the biota, leading to regional differences in species dominance and diversity along the coast. The West African continental shelf represents the smallest tropical shelf area of any of the four tropical regions. Northern and southern oceanic gyres direct cool currents along this coast, converge, and flow eastward to warm up again on the path toward the Americas. This elevates the depth of the thermocline along the coast of West Africa, limiting the area of the shelf that tropical organisms can thrive on and depresses marine biodiversity compared to other tropical regions (Briggs, 1974). Factors such as latitude and depth also influence fish species diversity and species richness generally increases as latitude decreases and decreases with depth (Moyle and Cech, 2000).

Longhurst (1958) considers the absence of reef-building corals in many tropical waters and explains the predominance of sand, silt and shells in bottom deposits. The very limited occurrence of reef building corals in the eastern Atlantic can be explained by conditions such as heavy rainfall and numerous rivers carrying high volumes of fresh water (thus lowering salinity) and silt into coastal waters. These conditions, together with thermal characteristics of the shelf waters elsewhere along the west African coast combine to prevent the formation of true coral reefs (Spalding *et al.*, 2001).

Despite this, limited coral communities (mainly restricted to the southern Gulf of Guinea) do exist and the biota includes some typical coral reef species that thrive on rocky reefs. The origins of this reef fauna are primarily a result of dispersal in relatively recent geological timescales, although there are examples of Tethyan origins as well (Floeter *et al.*, 2008). Deep-water corals (e.g. *Lophelia* spp.) are found in the deeper shelf and slope area in patches throughout the region (Global Distribution of Cold Water Corals. 2005. UNEP-World Conservation Monitoring Centre. <http://data.unep-wcmc.org/datasets/1>) and dead coral banks are also occurring throughout the region (Longhurst and Pauly, 1987).

### Patterns of Diversity

Generalized patterns of biodiversity distribution based on the species included in these volumes were obtained by combining the range maps of individual species. The reader must be aware that the maps used are generalized maps that do not take into consideration seasonal variations or differences in distribution at different life stages nor necessarily the actual observed depth ranges for demersal species. The composite distribution of the species included in this Guide shows that there are three main concentrations of marine biodiversity



along the west coast of Africa (Fig. 7). The area of highest species diversity is located in waters surrounding Senegal and the area southeast of the Canary Islands.

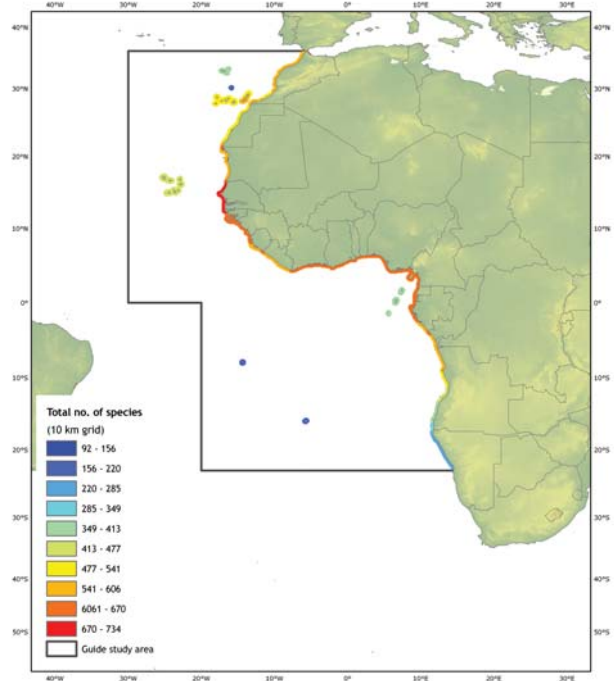
A peak in species richness off the coast of Senegal that may be partially a result of the proximity of the widest shelf area on the west coast of Africa that extends south from Senegal to Sierra Leone. Another factor contributing to this peak is also a number of warm temperate species that extends only as far south as Senegal (Briggs, 1974). However, as mentioned previously, the maps used for this analysis show generalized distribution patterns that do not take into consideration spatial and temporal changes based on changes in environmental conditions. Mixing of warm temperate and tropical species is not detected in our analysis in the southern part of the region because our area of coverage of the identification guide did not include the southern limit of Africa. A second peak in diversity occurs in the vicinity of the Canary Islands and most likely represents a mixing of both continental and island species that occur in close proximity to the main coast of Africa.

The southernmost concentration corresponds to the equatorial waters of the Gulf of Guinea from northern Angola northwards to Senegal. This is equatorial coastal biota with biodiversity attenuating in the offshore islands of São Tomé and Príncipe (Fig. 7).

Diversity was found to be lower to the north and south of the study area corresponding to the more temperate and subtropical waters of the northern area of the Canary – and the Benguela Current regions. Lower diversity in productive areas as compared to oligotrophic ecosystems have been noted by several authors (Margalef, 1974, 1997; Rex *et al.*, 2000 as referred to in MacPherson, 2002). Latitudinal gradients in species richness have also been described, MacPherson (2002) noted that benthic taxa are strongly influenced by hydrographic events (especially upwelling processes and river discharges) whereas pelagic species were less influenced by these coastal events.

## Fisheries

The eastern central Atlantic area is rich in fisheries resources, including locally important resident stocks as well as transboundary, straddling and migratory stocks. In addition to small scale and/or



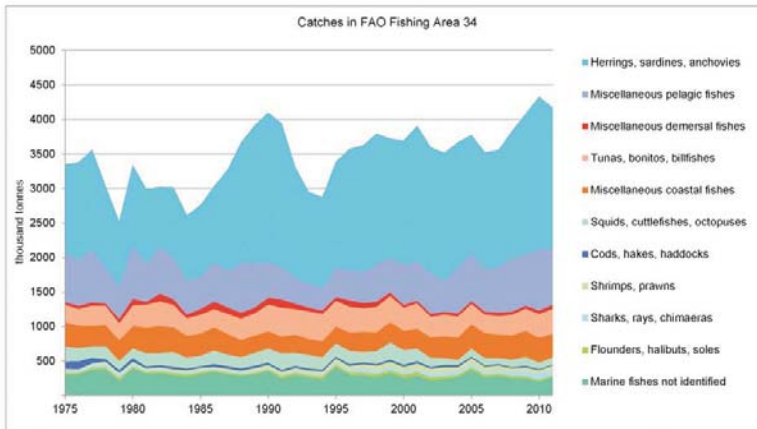
**Fig. 7 Pattern of species richness in western Africa for different taxonomic groups. All taxa (fishes, invertebrates, and marine turtles)**

industrial national fleets, the EEZs of the countries in the area also accommodate distant water fleets principally from Europe and Asia. Many of the fisheries are typically multispecific thus posing additional challenges for assessment and management.

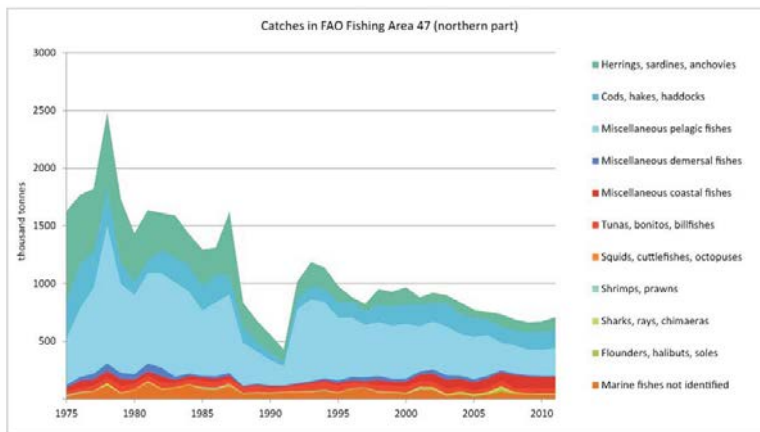
The total catches reported in FAO Fishing Area 34 of the eastern central Atlantic was around 4.1 million tonnes in 2012, below the 2008–2012 average of around 4.2 million tonnes (Fig. 8). In the southern Atlantic (northern part of FAO Fishing Area 47) catches were around 845 000 tonnes in 2012, above the 2008–2012 average of around 739 000 tonnes and showing an increasing trend since 2009 (Fig. 9).

Around 300 species or groups of species were reported from FAO Fishing Area 34 during the 1975–2012 period by a total of 23 coastal states and 35 distant water fishing nations. In the northern part of FAO Fishing Area 47, 20 fishing nations (including the United Kingdom and South Africa) in addition to Angola, Namibia and St Helena have been reporting catches.

Table 1 shows the average landings for the period 2008 to 2012 of the most important taxonomic units from FAO Fishing Areas 34



**Fig. 8 Landings of main ISSCAAP<sup>4</sup> groups in FAO Fishing Area 34**  
(source: FAO FishstatJ)



**Fig. 9 Landings of main ISSCAAP groups in FAO Fishing Area 47 (northern part)**  
(source: FAO FishstatJ)

and 47. The small pelagics species notably the clupeids sardine (*Sardina pilchardus*) and sardinellas (*Sardinella* spp.) dominate the catches in FAO Fishing Area 34, whereas in the northern part of FAO Fishing Area 47 it is the Cape horse mackerel (*Trachurus capensis*), the hakes (*Merluccius capensis* and *M. paradoxus*), and the clupeids that are the dominant species groups. The fluctuations in total catches are thus highly sensitive to changes in the catches of these species groups.

The composition of the fleet exploiting the main resources has varied over time, and in FAO Fishing Area 34 the coastal states have steadily developed their national fisheries over the last decades (Caramelo and Tandstad, 2005). Figure 10 illustrates

the relative importance of landings of the different fishing nations in the eastern central Atlantic, based on the average landings by country for the period 2008 to 2012 as reported to FAO. The coastal states account for around 66% of the catches in FAO Fishing Area 34 whereas in the northern part of FAO Fishing Area 47, Namibia and Angola account for around 90%. The main coastal fishing countries include Morocco, Senegal and Mauritania to the north; Ghana, Sierra Leone and Nigeria in the Gulf of Guinea and Namibia and Angola to the south. Of the distant water fishing nations, Belize, and the Russian Federation report the highest landings in Area 34 whereas Spain, Taiwan Province of China, Japan and the Russian Federation represent the distant water fleets with

<sup>4/</sup> International Standard Statistical Classification of Aquatic Animals and Plants (ISSCAAP)

the highest average catches in the northern part of Area 47 during the period 2008–2012 (Fig. 10).

### Main Resources and State of Stocks

Regional assessments of the state of the main stocks in FAO Fishing Area 34 are traditionally carried out by the pelagic and demersal Working Groups of the Fisheries Committee for the Eastern Central Atlantic (CECAF). These Working Groups normally divide Area 34 into two subareas, the northern CECAF subarea from Morocco down to the southern part of Senegal and the southern subregion from Guinea-Bissau to Angola, including Cape Verde and São Tomé and Príncipe. The section below reflects this subdivision. In Southeast Africa national assessments are carried out on a regular basis. Regional assessments and scientific surveys are also carried out through the Benguela Current Commission.

#### Northern CECAF Area

Sardine (*Sardina pilchardus*) is the dominant species in the catches off Northwest Africa<sup>5</sup>, constituting about 36% of overall main pelagic catch for this subregion in 2011 followed by the sardinellas (principally *Sardinella aurita* but also *Sardinella maderensis*) that constituted 26%. Cunene horse mackerel (*Trachurus trecae*) is the most important species of horse mackerels (FAO, 2013). Other important species include the Atlantic horse mackerel (*Trachurus trachurus*), the chub mackerel (*Scomber japonicus*), anchovy (*Engraulis encrasicolus*) and the bonga shad (*Ethmalosa fimbriata*).

The most important group of demersal species analysed by the FAO/CECAF Working Group on demersal resources in the northern CECAF area is cephalopods, principally the common octopus (*Octopus vulgaris*). The common octopus is the focus of highly specialized fisheries on two stocks off Dakhla and Cape Blanc.

The red pandora (*Pagellus bellottii*), widely distributed in the West African zone, was the most important species in terms of catches of the demersal fish (excluding hake) studied by the Working Group until 2003. After this year, catfishes (*Arius* spp.) start to be as important as red pandora. Catches of hakes

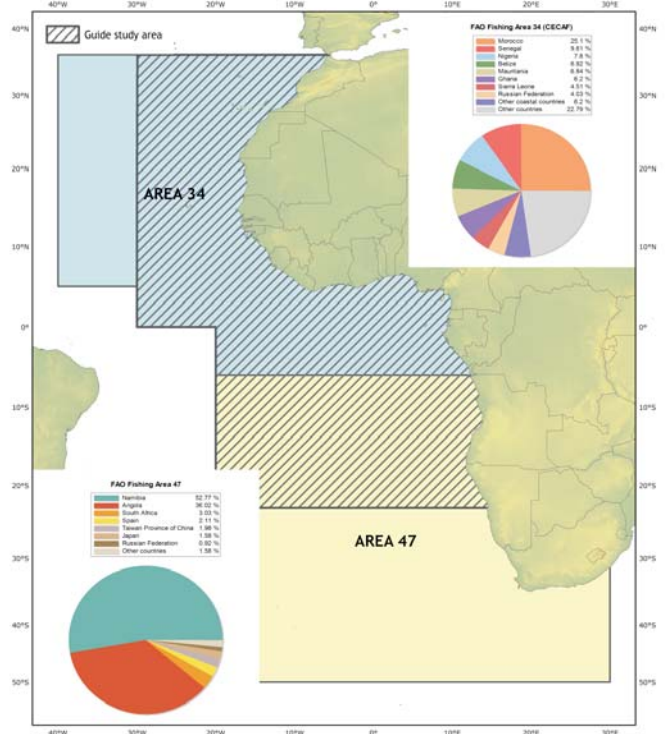


Fig. 10 Countries landing in FAO Fishing Area 34 and FAO Fishing Area 47 (northern part). Average from 2008–2012

(*Merluccius merluccius*, *M. senegalensis* and *M. polli*) in 2012 represent on average 7% of total catch of all demersal species analysed. The deep-water rose shrimp (*Parapenaeus longirostris*) and the southern pink shrimp (*Penaeus notialis*) are also important in the region and constitute 10% of catches of the demersal species studied (FAO/CECAF, 2014b in preparation).

In general the small pelagic stocks in the northern CECAF region have been the target of an increasing demand for exploitation over the last decades. Recent assessments have shown that stocks of *Sardinella*, in particular *S. aurita* as well as the stocks of horse mackerel (*Trachurus trecae*) are overexploited in the subregion. Chub mackerel (*Scomber japonicus*), anchovy (*Engraulis encrasicolus*) and bonga shad (*Ethmalosa fimbriata*) are fully exploited. The sardine to the south of Cape Boujador is not fully exploited (FAO, 2011; FAO/CECAF, 2012).

Many of the commercially important demersal stocks in this region are in general intensely

<sup>5/</sup> From Morocco to the South of Senegal

exploited (Caramelo and Tandstad, 2005; Tandstad and Caramelo, 2011). The assessments carried out by the FAO/CECAF Working Group on demersal resources off northwest Africa have shown that many of the important demersal stocks such as the white grouper (*Epinephelus aeneus*) stock in Mauritania, the Gambia and Senegal is severely overexploited; other overexploited stocks include the common octopus (*Octopus vulgaris*) and shrimps (*Parapenaeus longirostris* in Morocco and *Penaeus notialis* in Senegal-Gambia) (FAO, 2011; FAO/CECAF, 2012).

### Southern CECAF Area

In the southern CECAF zone, between the northern border of Guinea-Bissau and the southern border of Angola, including the Cape Verde islands and the islands of São Tomé and Príncipe, the most important pelagic species in terms of landings are the two sardinella species composed principally of the round sardinella (*S. aurita*) but also including the Madeiran sardinella (*S. maderensis*). Together they constituted nearly 33% of the 2007 total landings of small pelagic fish studied in the FAO/CECAF Working Group on the Assessment of Small Pelagic Fish – Subgroup South in October 2009. Anchovy (*Engraulis encrasicolus*), bonga shad (*Ethmalosa fimbriata*) and horse mackerels (principally *Trachurus trecae*) are also important species landed in the southern CECAF region (FAO/CECAF, 2013).

Of the demersal species, croakers (*Pseudolithus* spp.) from the sciaenid group made up an average of about 37 000 tonnes in the period 2006–2010 with a contribution to the total catches of the main demersal fish studied by the FAO/CECAF Working Group on the Assessment of Demersal Resources, Subgroup South, of about 14% in 2010. Bigeye grunt (*Brachydeuterus auritus*) and seabreams (*Dentex* spp.) are other important fish species. Although low landings are recorded for deep-water rose shrimp (*Parapenaeus longirostris*), southern pink shrimp (*Penaeus notialis*) and cuttlefishes (*Sepia* spp.), these species are considered highly valuable due to their high commercial value.

Small pelagic resources are important but fluctuating resources in this region where they are mainly exploited by local small-scale or semi-industrial fleets, although some industrial fleets operate in part of the subregion. They have mostly been classified as non-fully to fully exploited, the exception being the *Sardinella aurita* stock in the western Gulf of Guinea (Côte d'Ivoire, Ghana, Togo and Benin) and the southern stock of Cunene horse mackerel (*Trachurus trecae*) (Gabon, Congo, Congo DR and Angola) which were considered overexploited (FAO, 2011; FAO, 2012; FAO/CECAF, 2013). The demersal resources in this region are

intensely exploited, and of the demersal species, 9 of the demersal stocks analysed by the last FAO/CECAF Working Group were found to be overexploited. This includes many demersal fish stocks, such as West African croakers nei (*Pseudolithus* spp.) and others (FAO, 2011; FAO/CECAF, 2012; FAO/CECAF, 2014a in preparation).

### Northern Part of FAO Fishing Area 47

In the northern part of FAO Fishing Area 47 the large abundance of a few species characterises the ichthyofauna of the pelagic zone in the southern region.

The small pelagic fisheries of the region are dominated by six taxonomic groups: cape horse mackerel (*Trachurus capensis*) and cunene horse mackerel (*T. trecae*), southern African pilchard (*Sardinops sagax*, also still referred to as *S. ocellatus*), southern African anchovy (*Engraulis capensis*), sardinellas (round *Sardinella aurita* and Madeiran or flat *S. maderensis*) and Whitehead's round herring (*Etrumeus whiteheadi*) (Barros and Cochrane, 2011).

Hakes (*Merluccius capensis* and *M. paradoxus*) dominate the demersal fisheries. Other important demersal species include seabreams (*Dentex* spp.) and in particular the large-eye dentex (*Dentex macrophthalmus*), shrimps and lobster (*Penaeus notialis*, *Parapenaeus longirostris* and *Panulirus regius*) and the West African geryon (*Chaceon maritae*).

The pelagic species also dominate the landings in this region, with the southern African pilchard (*Sardinops sagax*), horse mackerels (*Trachurus capensis* and *T. trecae*), southern African anchovy (*Engraulis capensis*) and sardinellas (*Sardinella aurita* and *S. maderensis*) contributing to the highest proportion of pelagic landings, although catches of pilchard and horse mackerels have decreased in recent years as compared to earlier in this decade. Hake constitute the demersal group with the highest reported catches. Catches of hake have remained fairly stable and have remained between 260 000 tonnes and 320 000 tonnes since 1995 with a mean of 145 000 tonnes in the period 2008 to 2012.

Cochrane (2005) and Barros and Cochrane (2011) noted that most of the commercially important stocks within the region are classified as being between fully and overexploited. Many (but not all) of the currently overexploited stocks are frequently the result of historical overexploitation rather than current overfishing. A regional assessment of the Cunene horse mackerel (*T. trecae*) carried out through CECAF indicated that this stock is overexploited.

The West African geryon stock from Angola and Namibia (*Chaceon maritae*) is an important fishery for the region. Assessment of this stock indicates that it is currently overexploited, but probably recovering slowly (MFMR, 2010). The shrimp fishery is also important, in particular in Angola and includes both deepwater (*Parapenaeus longirostris* and *Aristeus varidens*) and shallow-water shrimps (*Penaeus kerathurus* and other Penaeidae), the latter important in the artisanal fishery. The Angolan stocks of deep-water rose shrimp (*Parapenaeus longirostris*) and striped red shrimp (*Aristeus varidens*) are intensively exploited (Barros and Cochrane, 2011).

## Conclusion

The wide range of species and the high number of countries exploiting these resources in west Africa pose a range of challenges for fisheries management.

Fisheries dependent information, including accurate information on catch or landings, is important for fisheries management. However due to various reasons including the difficulty in identifying taxonomic units to species level, many countries report species groups. As can be seen from Table 1, this is also the case in the eastern central Atlantic. This lack of taxonomic detail of catch data is a challenge to fisheries scientists analysing the data for management purposes, as species specific parameters are frequently sought. The FAO CECAF Assessment Working Groups and others have pointed to the problems associated with low resolution of taxonomic data and have stressed the need to report catches to a lowest appropriate taxonomic level for key species. This new addition of the eastern central Atlantic guide is intended to help achieving this objective.

Area 34		Area 47 (north)	
Statistical taxonomic unit (common name)	Average landings (04-08) (tonnes)	Statistical taxonomic unit (common name)	Average landings (04-08) (tonnes)
<i>Sardina pilchardus</i> (sardine)	828 206	<i>Trachurus capensis</i> (Cape horse mackerel)	225 066
<i>Trachurus</i> spp. (horse mackerels)	418 083	<i>Merluccius capensis</i> , <i>M. paradoxus</i> (hakes)	152 183
<i>Sardinella</i> spp. (sardinellas)	355 840	<i>Sardinella</i> spp. (sardinellas)	74 025
<i>Sardinella aurita</i> (round sardinella)	281 392	<i>Osteichthyes</i> (bony fishes)	43 421
<i>Scomber japonicus</i> (chub mackerel)	237 325	<i>Dentex</i> spp. (seabreams)	32 665
<i>Osteichthyes</i> (bony fishes)	236 964	<i>Sardinops sagax</i> / <i>S. ocellatus</i> (southern African pilchard)	22 233
<i>Ethmalosa fimbriata</i> (bonga)	235 548	<i>Trachurus trecae</i> (Cunene horse mackerel)	21 729
<i>Sardinella maderensis</i> (flat sardinella)	175 411	<i>Pseudotolithus</i> spp. (West African croakers nei)	19 692
<i>Engraulis encrasicolus</i> (anchovy)	170 287	<i>Argyrosomus hololepidotus</i> (southern meagre)	19 238
<i>Katsuwonus pelamis</i> (skipjack tuna)	161 109	<i>Thunnus alalunga</i> (albacore)	16 518
<i>Thunnus albacares</i> (yellowfin tuna)	88 414	<i>Thunnus obesus</i> (bigeye tuna)	13 972
Octopodidae (octopuses nei)	60 510	Ariidae (sea catfishes nei)	11 717
Ariidae (sea catfishes nei)	52 209	<i>Ilisha africana</i> (West African ilisha)	10 677
<i>Thunnus obesus</i> (bigeye tuna)	48 848	<i>Scomber japonicus</i> (chub mackerel)	10 554
Sepiidae, Sepiolidae (cuttlefishes and squids nei)	31 959	Polynemidae (blue shark)	6 101

Area 34		Area 47 (north)	
Statistical taxonomic unit (common name)	Average landings (04-08) (tonnes)	Statistical taxonomic unit (common name)	Average landings (04-08) (tonnes)
<i>Elasmobranchii</i> (sharks, rays, skates nei)	30 743	<i>Prionace glauca</i> (blue shark)	6 043
Mugilidae (mulletts nei)	28 684	<i>Brachydeuterus auritus</i> (bigeye grunt)	5 715
<i>Brachydeuterus auritus</i> (bigeye grunt)	27 469	<i>Xiphias gladius</i> (swordfish)	5 511
<i>Sphyræna</i> spp. (barracuda)	27 441	<i>Lophius vomerinus</i> (devil anglerfish)	4 972
Sciaenidae (croakers nei)	24 673	<i>Genypterus capensis</i> (kingklip)	4 403
<i>Pseudotolithus</i> spp. (croakers)	24 138	Pleuronectiformes (flatfishes nei)	3 538
<i>Natantia</i> (shrimps)	24 080	<i>Thyrsites atun</i> (snoek)	3 519
<i>Polydactylus quadrifilis</i> (giant African threadfin)	23 085	<i>Loligo reynaudi</i> (Cape Hope squid)	3 466
<i>Trichiurus lepturus</i> (largehead hairtail)	22 743	<i>Thunnus albacares</i> (yellowfin tuna)	2 988
<i>Pseudotolithus elongatus</i> (bobo croaker)	21 081	Sciaenidae (croakers, drums nei)	2 699
Haemulidae (=Pomadasyidae) (grunt nei)	20 625	<i>Merluccius capensis</i> (shallow-water Cape hake)	2 232
<i>Galeoides decadactylus</i> (lesser African threadfin)	18 559	<i>Elasmobranchii</i> (sharks, rays, skates nei)	2 216
<i>Chloroscombrus chrysurus</i> (Atlantic bumper)	17 567	Serranidae (groupers, seabasses nei)	1 567
<i>Ilisha africana</i> (African ilisha)	14 795	<i>Austroglossus microlepis</i> (West coast sole)	1 489
Cynoglossidae (tonguefishes nei)	14 777	<i>Chaceon maritae</i> (West African Geryon )	1 284
Rajiformes (skates and rays)	13 962	<i>Pterogymnus laniarius</i> (Panga seabream)	1 182
Sparidae (Porgies, seabreams nei)	13 645	Rajiformes (rays, stingrays, mantas nei)	1 148
<i>Penaeus notialis</i> (southern pink shrimp)	12 874	<i>Pagrus</i> spp. (Pargo breams nei)	1 002
<i>Lutjanus</i> spp. (snappers)	11 731	<i>Zeus faber</i> (John dory)	901
<i>Nematopalaemon hastatus</i> (estuarine prawn)	11 500	Loliginidae, Ommastrephidae (squids)	251
<i>Euthynnus alletteratus</i> (little tunny)	10 910	<i>Engraulis capensis</i> (southern African anchovy)	215
<i>Pagellus bellottii</i> (red pandora)	8 463	<i>Parapenaeus longirostris</i> (Deep-water rose shrimp)	176
<i>Merluccius merluccius</i> (European hake)	7 575	<i>Lepidopus caudatus</i> (silver scabbardfish)	171
Pleuronectiformes (flatfishes nei)	7 262	<i>Etrumeus whiteheadi</i> (Whitehead's rund herring)	169
<i>Octopus vulgaris</i> (common octopus)	6 214	<i>Jasus lalandii</i> (Cape rock lobster)	116

**Table 1. Landings (tonnes) of the most important statistical taxonomic units from FAO Fishing Areas 34 and 47 (North) from 2008 to 2012 ranked according to mean catch within the period.**

## Map Data Sources

The projection used for the maps in this guide is a Cylindrical Equa-Area projection, with the central meridian at 5°E, and the standard parallel at 10°N. Country and continent borders are from the UN Cartographic Unit, last updated in 2008. FAO Statistical Areas for Fishery Purposes were provided by FAO Fisheries and Aquaculture Department. Bathymetric data are from the General Bathymetry Chart of the Oceans (GEBCO) in grid format at resolution of 30 arc-seconds. Mean sea surface temperature maps were obtained from site <http://podaac.jpl.nasa.gov> maintained by the NASA JPL Physical Oceanography DAAC, Pasadena, CA in 2010.

## Disclaimer

The designations employed and the presentation of material in the map(s) are for illustration only and do not imply their expression of any opinion whatsoever on the part of FAO concerning the legal or constitutional status of any country, territory or sea area, or concerning the delimitation of frontiers or boundaries.

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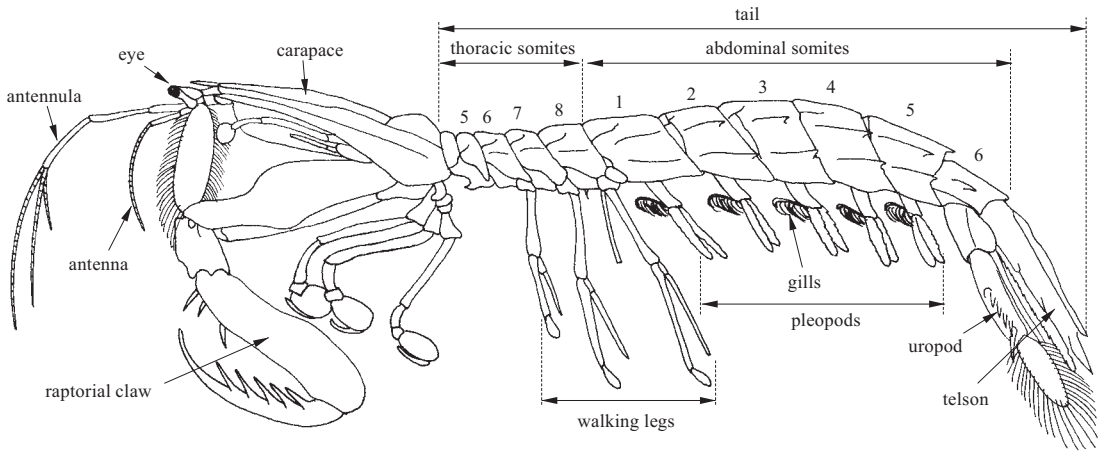
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# **STOMATOPODS**

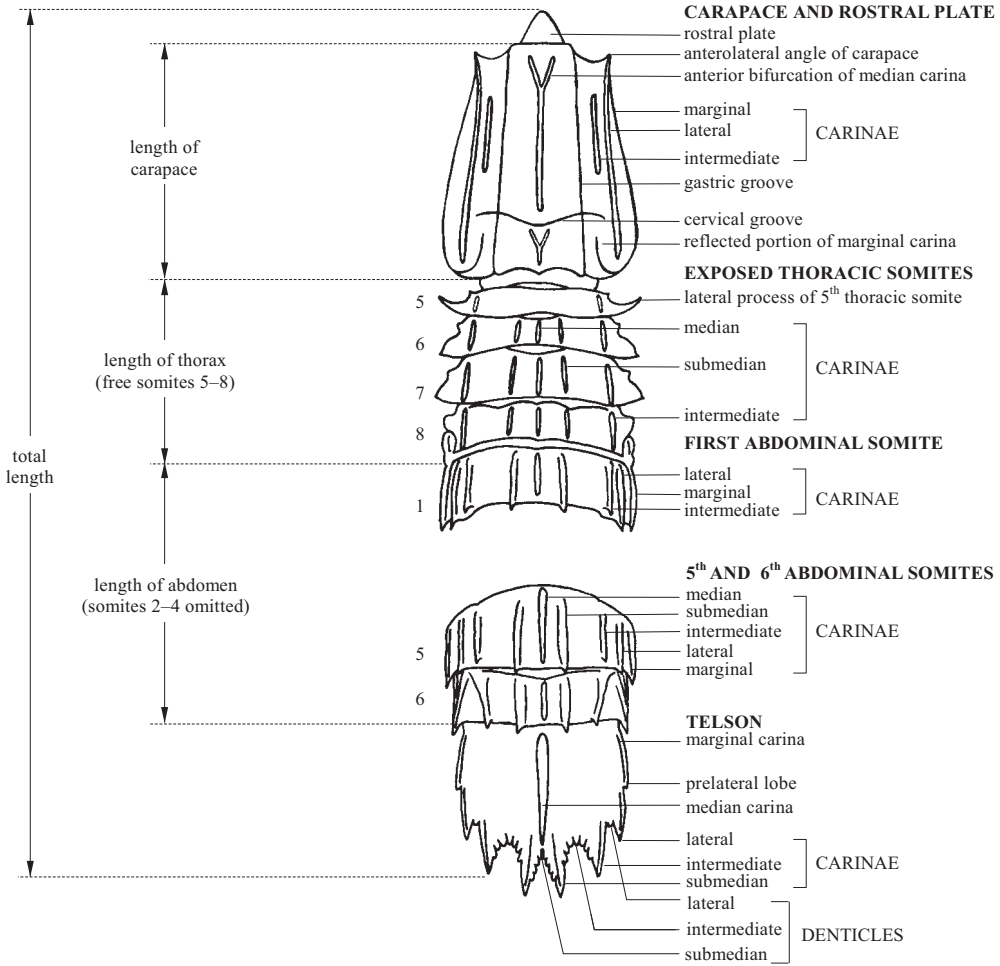
by Charles H.J.M. Fransen

Department of Marine Zoology, Netherlands Centre for Biodiversity – Naturalis, Leiden, The Netherlands

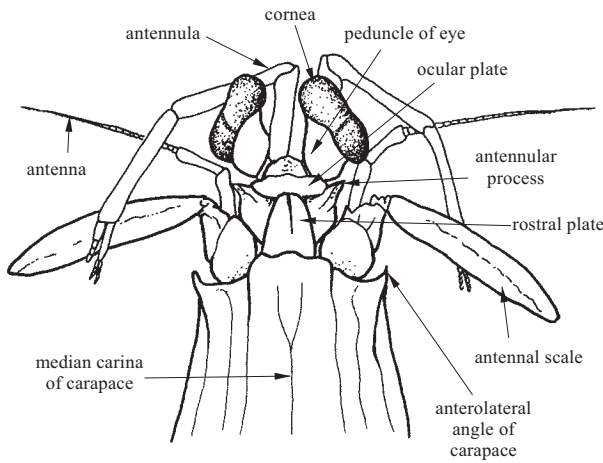
## TECHNICAL TERMS AND MEASUREMENTS



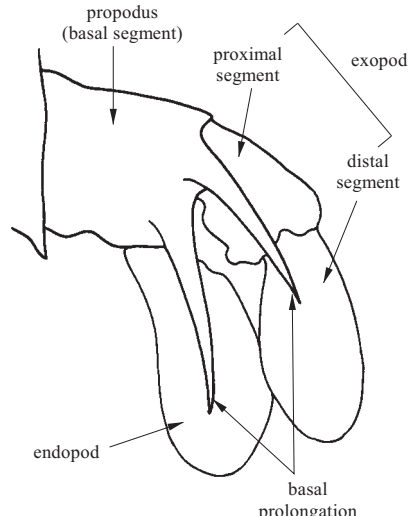
**lateral view of a stomatopod (mantis shrimp)**



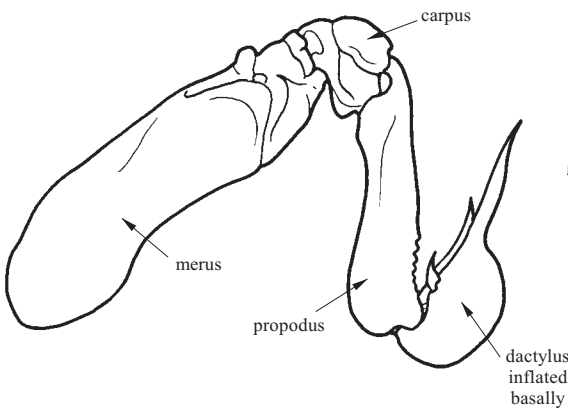
**dorsal view (without head and extremities)**



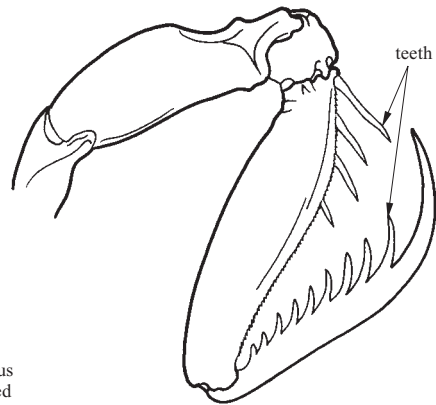
anterior part of body  
(dorsal view)



left uropod  
(ventral view)



crushing claw



spearing claw

basic types of raptorial claw

### GENERAL REMARKS

**S**tomatopods, also called mantis shrimps, are elongate, flattened, small and large, shrimp-like or lobster-like animals with large movable eyes, often with bilobed cornea. The **carapace is very short, covering only a third of the body and not covering the eyes. Only 3 walking legs**; 5 pairs of pleopods under the anterior 5 abdominal somites (I to V); **a long, flattened tail (including part of the thorax, abdominal segments and terminal telson)**; 1 pair of lateral uropods on the sixth abdominal somite which includes a strongly spined ventral process; a telson that is often spined posteriorly. The most conspicuous characteristic of mantis shrimps is a pair of **massive, praying mantis-like “raptorial” claws** (second pair of legs), which are folded under the sides of the carapace. In many of the larger stomatopods, the terminal 2 segments of the claws are usually lined with sharp, serrated teeth. The claws are adapted to crushing or spearing. Those species with crushing claws have the terminal segment of the claw broadened and heavily buttressed basally. Spearing claws are more elongate, more conspicuously toothed, and much more slender, not inflated basally.

Stomatopods generally live in burrows, which they may leave to forage for food. Although the stomatopods are not known to be fished commercially in Fishing Areas 34 and 47 at the present time, they include large (to 30 cm), conspicuous representatives, which are often caught by trawls in commercial shrimp operations. In some parts of the world mantis shrimps are considered a delicacy and consequently are fished commercially and marketed. Although most of the more than 25 species occurring in Fishing Areas 34 and 47 are too small or too rare to be of potential interest to fisheries, 2 families contain species large and apparently abundant enough to have commercial potential.

Altogether over 350 species of extant stomatopods are known, subdivided in 7 superfamilies, 17 families and over 70 genera, distributed in tropical, subtropical and temperate seas.

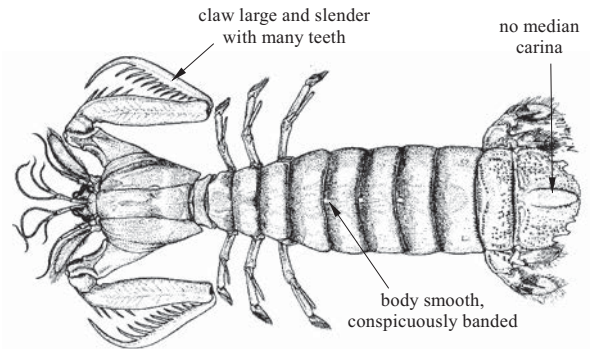
**GUIDE TO FAMILIES OF INTEREST TO FISHERIES OCCURRING IN THE AREA**

**LYSIOSQUILLIDAE**

Page 24

**Banded mantis shrimps**

Body smooth, lacking longitudinal ridges or carinae; telson with at most low median boss, lacking sharp dorsal median carina; eyes T-shaped, with large, bilobed cornea; raptorial claw large and slender. Three species found in the area, 1 species of *Lysiosquilloides* and 2 of *Lysiosquilla* only 1 of which, *Lysiosquilla hoevenii*, is large and of potential interest to fisheries.

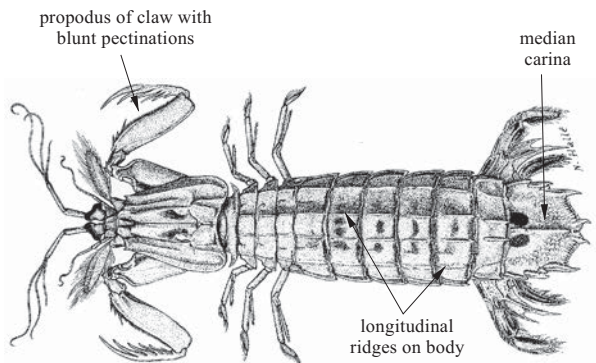


**SQUILLIDAE**

Page 28

**Squillid mantis shrimps**

Body with longitudinal carinae or ridges; telson with distinct median longitudinal carina; eyes T-shaped, with bilobed cornea; raptorial claw large and slender; opposable margin of propodus of claw lines with low, blunt pectinations; posterior angles of carapace rounded, convex, rather than excavate. Three species of Squillidae occurring in the area are large enough to be of potential interest to fisheries.



KEY TO FAMILIES OCCURRING IN THE AREA

1a. Telson without median carina (Fig. 1a) . . . . . → 2

1b. Telson with distinct median carina (Fig. 1b) . . . . . → 5

2a. Dactylus of claw inflated basally (Fig. 2a) . . . . . **Coronididae**

2b. Dactylus of claw not inflated (Fig. 2b) . . . . . → 3

3a. Distal segment of endopod of walking legs circular or oval (Fig. 3a); total length not exceeding 7 cm . . . . . → 4

3b. Distal segment of endopod of walking legs strap-shaped, elongate (Fig. 3b); total length to at least 30 cm. . . **Lysiosquillidae**

4a. Proximal portion of outer margin of uropodal endopod with strong fold (Fig. 4a) . . . . . **Nannosquillidae**

4b. Proximal portion of outer margin of uropodal endopod lacking strong fold (Fig. 4b) . . . . . **Tetrasquillidae**

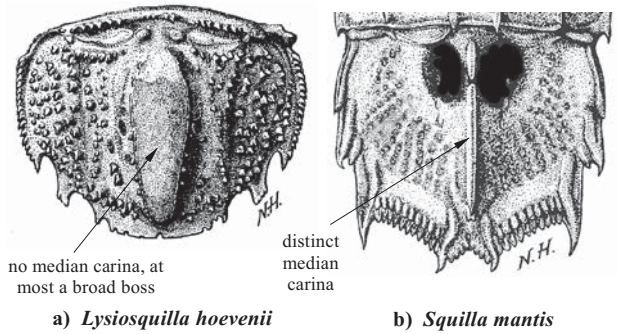


Fig. 1 telson

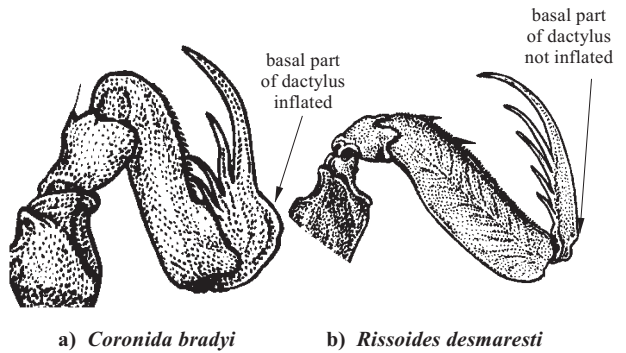


Fig. 2 claw

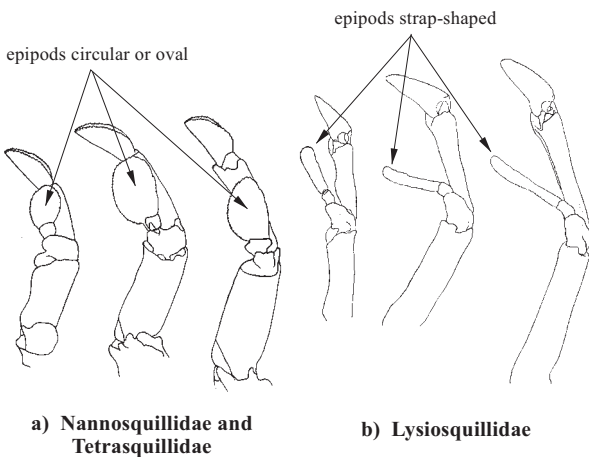


Fig. 3 walking legs 1 to 3

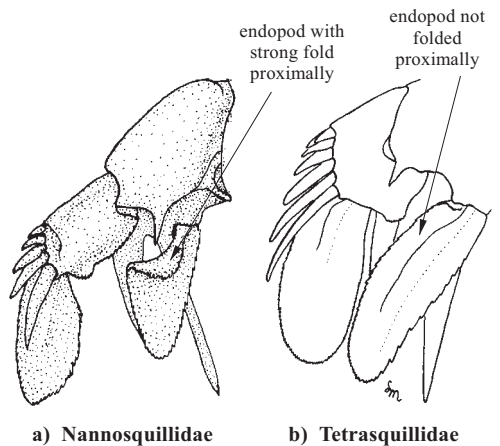
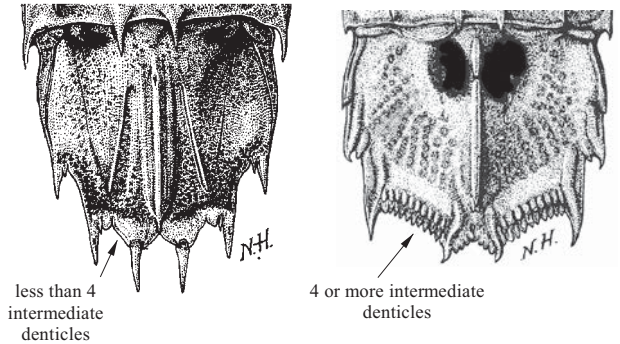


Fig. 4 uropod

5a. Telson with less than 4 intermediate denticles on each side of posterior margin (Fig. 5a) . . . . . → 6

5b. Telson with 4 or more intermediate denticles on each side of posterior margin (Fig. 5b) . . . . . **Squillidae**



a) Pseudosquillidae                      b) Squillidae  
Fig. 5 telson

6a. Dactylus of claw inflated basally (Fig. 6a) . . **Protosquillidae**

6b. Dactylus of claw not inflated basally (Fig. 6b and c) . . . . . → 7

7a. Dactylus of claw with 4 or more teeth (Fig. 6c) . . . . . **Eurysquillidae**

7b. Dactylus of claw with 3 teeth (Fig. 6b) . . . . . → 8

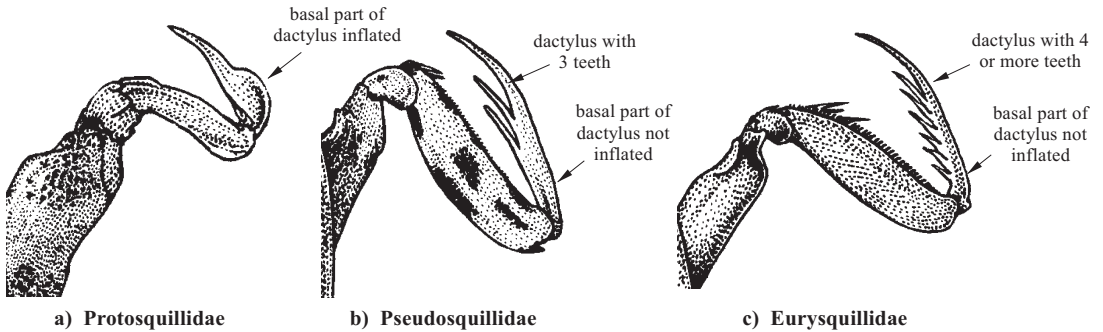
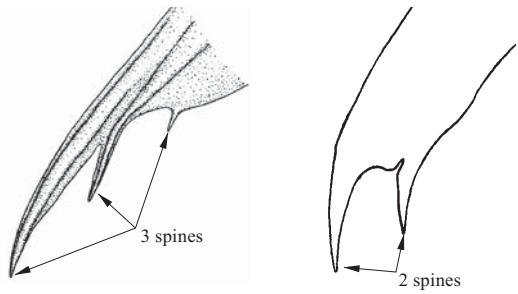


Fig. 6 claw

8a. Basal prolongation of uropod produced into 3 spines (Fig. 7a); cornea asymmetrically bilobed, outer lobe larger. . . **Parasquillidae**

8b. Basal prolongation of uropod produced into 2 spines (Fig. 7b); cornea not asymmetrically bilobed . . . . . **Pseudosquillidae**



a) Parasquillidae                      b) Pseudosquillidae

Fig. 7 basal prolongation of uropod



**LIST OF ORDER, SUPERFAMILIES AND FAMILIES OCCURRING IN THE AREA**

Classification according to Schram and Müller, 2004

The symbol  is given for those families which are treated further in this contribution.**Order STOMATOPODA** Latreille, 1817**Superfamily EURYSQUILLOIDEA** Ah Yong and Harling, 2000

EURYSQUILLIDAE Manning, 1977

**Superfamily GONODACTYLOIDEA** Giesbrecht, 1910

PROTOSQUILLIDAE Manning, 1980

PSEUDOSQUILLIDAE Manning, 1977

**Superfamily LYSIOSQUILLOIDEA** Giesbrecht, 1910

CORONIDIDAE Manning, 1980

 LYSIOSQUILLIDAE Giesbrecht, 1910

NANNOSQUILLIDAE Manning, 1980

TETRASQUILLIDAE Manning and Camp, 1993

**Superfamily PARASQUILLOIDEA** Ah Yong and Harling, 2000

PARASQUILLIDAE Manning, 1995

**Superfamily SQUILLOIDEA** Latreille, 1802 SQUILLIDAE Latreille, 1802**References**

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Order STOMATOPODA

Superfamily LYSIOSQUILLOIDEA

LYSIOSQUILLIDAE

Banded mantis shrimps

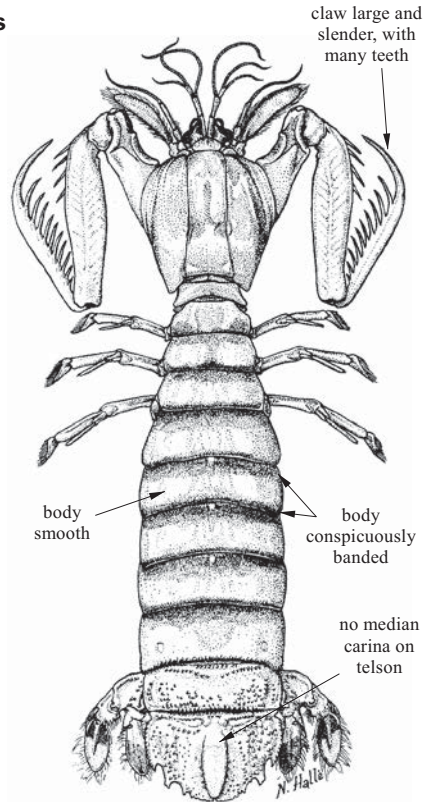
**Diagnostic characters:** Body smooth, lacking longitudinal ridges or carinae. Telson with at most low median boss, lacking sharp dorsal median carina; marginal teeth or spines of telson inconspicuous. Eyes T-shaped, with large, bilobed cornea. Raptorial claw large and slender, adapted for spearing prey, with toothed edge of dactylus bearing numerous, large, serrated teeth or spines. **Colour:** usually clearly banded with alternate light and darkly pigmented bands.

**Habitat, biology, and fisheries:** Almost nothing is known about the biology of lysiosquillids. They form simple burrows with 2 entrances, in level-bottom habitats in shallow water, from shore to a depth of about 25 m. The burrow openings may be as much as 10 m apart. Although they generally hunt from the mouth of their burrow, they occasionally leave their burrows and may be caught at night lights or in trawls. Three species are found in the area, 1 species of *Lysiosquilloides* and 2 of *Lysiosquilla* only 1 of which, *Lysiosquilla hoevenii*, is large and of potential interest to fisheries.

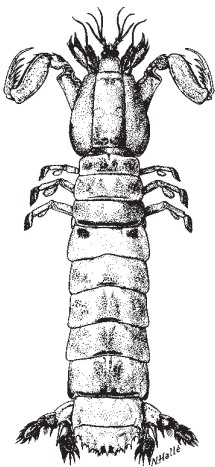
Similar families occurring in the area

Nannosquillidae, Tetrasquillidae: also smooth-bodied and also may be conspicuously banded with alternate dark light bands of pigment, but much smaller, rarely exceeding 7 cm in length, and of no commercial importance.

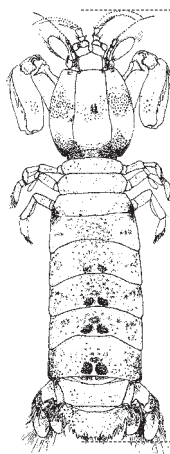
Coronididae: dactylus of claw inflated basally.



dorsal view

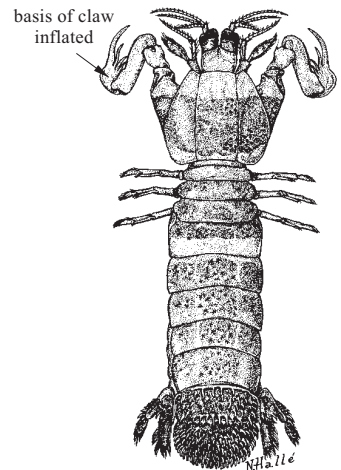


Nannosquillidae



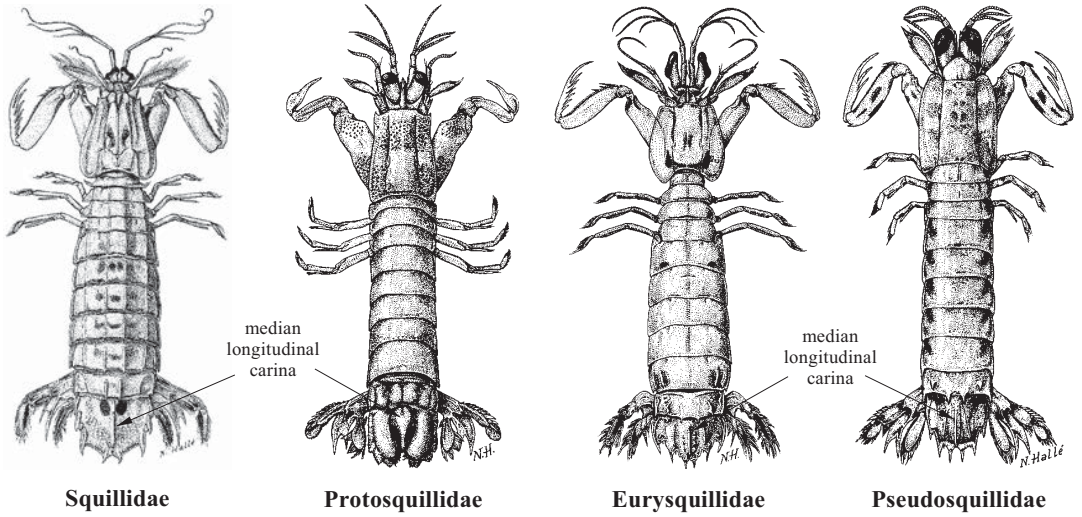
Tetrasquillidae

small animals, less than 7 cm in length



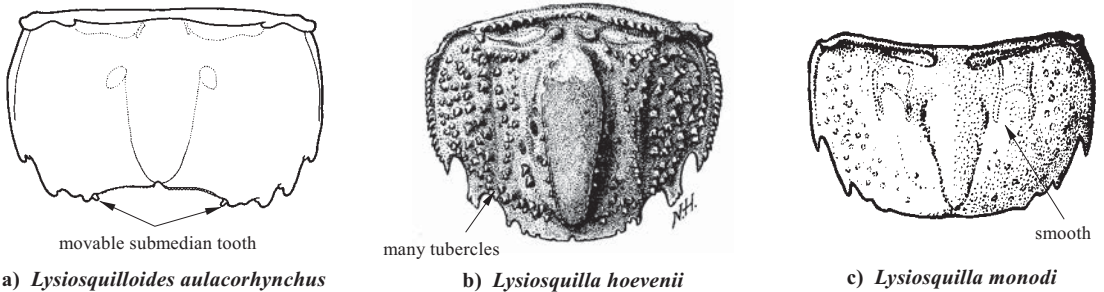
Coronididae

Squillidae, Protosquillidae, Eurysquillidae, Parasquillidae, Pseudosquillidae: with distinct median carina on telson.

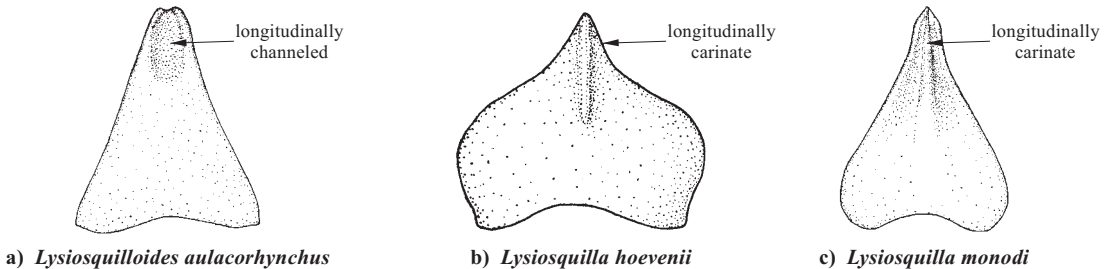


**Key to the species of Lysiosquillidae occurring in the area**

- 1a. Telson with movable submedian teeth (Fig. 1a); rostral plate not carinate, longitudinally channelled (Fig. 2a) . . . . . ***Lysiosquilloides aulacorhynchus***
- 1b. Telson lacking movable submedian teeth (Fig. 1b and c); rostral plate longitudinally carinate (Fig. 2b and c) . . . . . → 2
- 2a. Dorsal surface of telson with numerous tubercles (Fig. 1b) . . . . . ***Lysiosquilla hoevenii***
- 2b. Dorsal surface of telson smooth, non-tuberculate (Fig. 1c) . . . . . ***Lysiosquilla monodi***





**Fig. 1 telson**



**Fig. 2 rostral plate**

**List of species occurring in the area**

The symbol  is given when species accounts are included.

-  *Lysiosquilla hoevenii* (Herklots, 1851).  
*Lysiosquilla monodi* Manning, 1977.  
*Lysiosquilloides aulacorhynchus* (Cadenat, 1957).

**References**

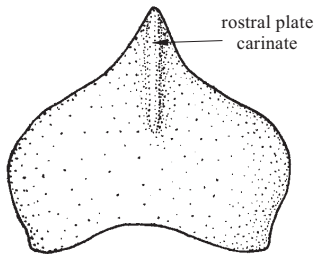
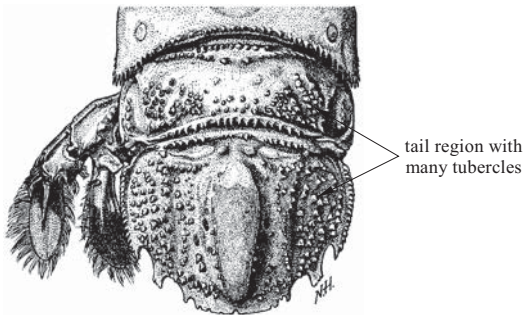
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- Manning, R.B.** 1981. Stomatopods. In W. Fischer, G. Bianchi & W.B. Scott, eds. *FAO species identification sheets for fishery purposes, Eastern Central Atlantic; Fishing Areas 34, 47 (in part)*. Rome, FAO. Vol. VI: pag.var.
- Schram, F.R. & Müller, H.-G.** 2004. *Catalog and bibliography of the fossil and recent Stomatopoda*. Backhuys Publishers, Leiden, The Netherlands, 1–264 pp.

***Lysiosquilla hoevenii*** (Herklots, 1851)

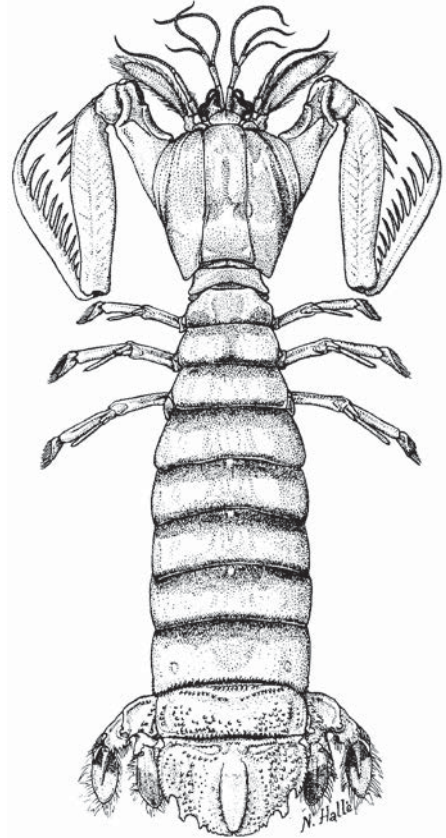
**Frequent synonyms / misidentifications:** None / None.

**FAO names:** **En** – Lizard mantis; **Fr** – Squille lézard géante; **Sp** – Galera gigante.

**Diagnostic characters:** A moderately large to very large stomatopod. Body conspicuously flattened, smooth, lacking ridges or spines except for the **tail region (sixth abdominal segment and telson)** which is **prickly with small bumps or tubercles**; telson with a raised, elongate boss medially, but without a median ridge. **Rostral plate broader than long, with a low median carina on its anterior third.** Claws very large, often longer than carapace and armed with 10 to 12 sharp spines on the terminal segment. **Colour:** body conspicuously marked with **light and dark cross-bands**.



rostral plate



**Size:** Maximum: about 27 cm body length; common over 20 cm.

**Habitat, biology, and fisheries:** Generally found in shallow water, at 30 m or less. Taken incidentally throughout its range, mainly in artisanal fisheries. Caught mainly in lobster pots or shrimp trawls.

**Distribution:** Off West Africa, from the Cape Verde Islands and Senegal to Angola.



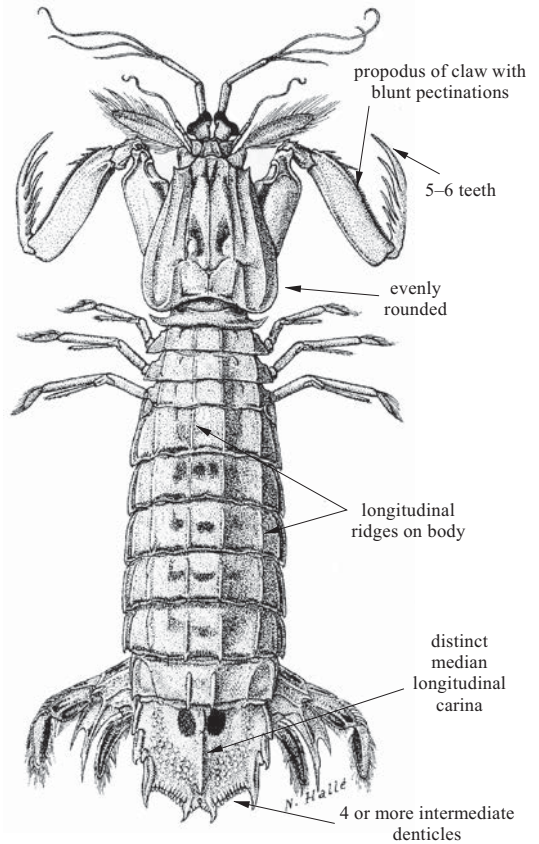
**Superfamily SQUILLOIDEA**

**SQUILLIDAE**

**Squillid mantis shrimps**

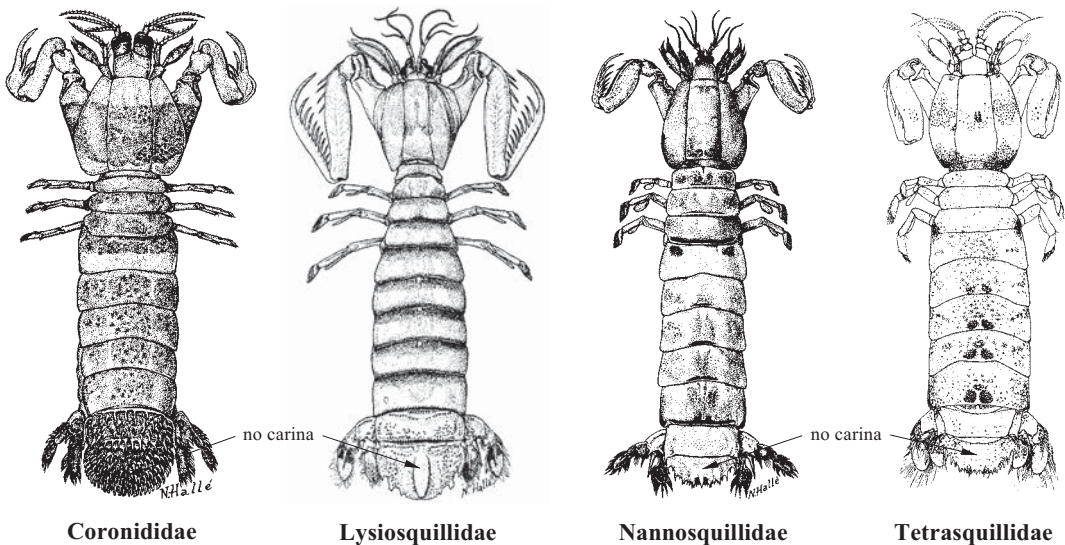
**Diagnostic characters:** Large mantis shrimps (maximum total length more than 20 cm). **Body with longitudinal carinae or ridges. Posterolateral corners of carapace evenly rounded, not excavate. Telson with distinct median longitudinal carina and conspicuous posterior spines; with 4 or more intermediate denticles.** Eyes T-shaped, with bilobed cornea. Raptorial claw large and conspicuous, slender, adapted for spearing. Dactylus or raptorial claw usually with 5 or 6 serrated teeth on inner margin. **Opposable margin of propodus of claw with low, blunt pectinations.**

**Habitat, biology, and fisheries:** Squillids are burrowers in level bottoms and they seek prey at night. They occur in the sublittoral to depths over 300 m. They are often collected in shrimp trawls and beach seines. Three species of Squillidae occurring in the area are large enough to be of potential interest to fisheries.



**Similar families occurring in the area**

Coronidae, Lysiosquillidae, Nannosquillidae, Tetrasquillidae: without median longitudinal carina on telson.



**Coronidae**

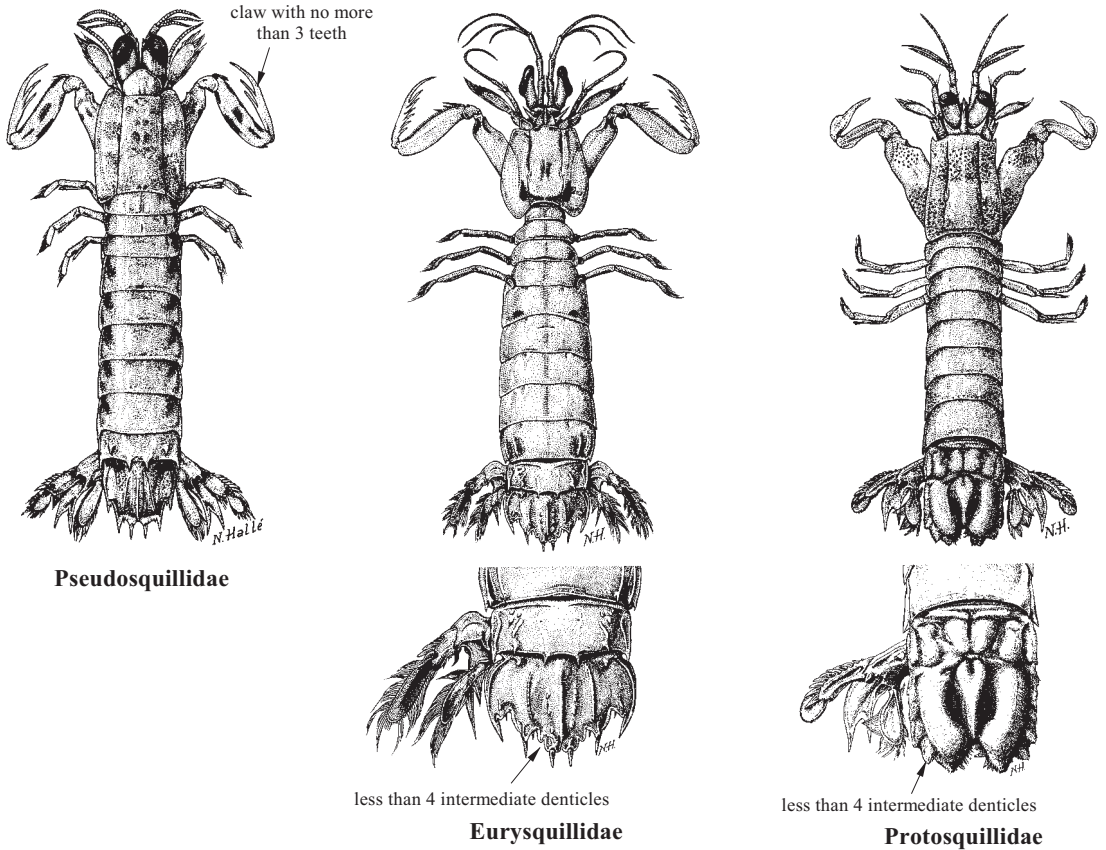
**Lysiosquillidae**

**Nannosquillidae**

**Tetrasquillidae**

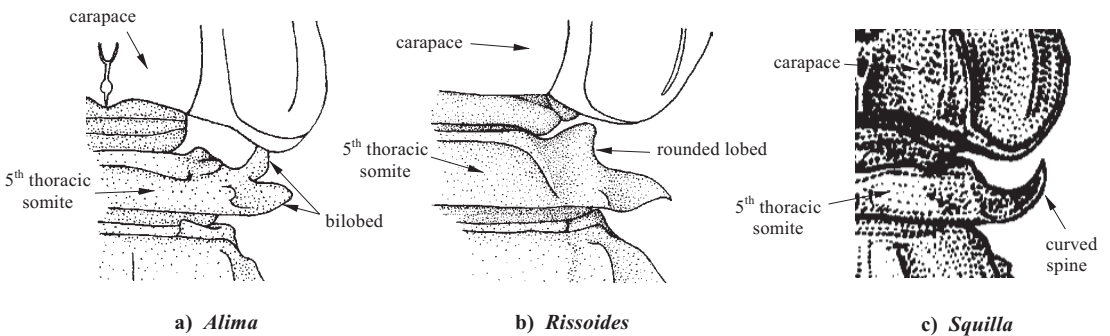
Pseudosquillidae: dactylus of raptorial claw with no more than 3 teeth on inner margin.

Eurysquillidae, Parasquillidae, Protosquillidae: less than 4 intermediate denticles on telson.



**Key to the species of Squillidae occurring in the area**

- 1a. Lateral process of fifth thoracic somite bilobed (Fig. 1a) . . . . . → 2
- 1b. Lateral process of fifth thoracic somite not bilobed, a rounded lobe or single curved spine (Fig. 1b and c) . . . . . → 3



**Fig. 1 fifth thoracic somite**

- 2a. Dactylus of claw with 6 teeth (Fig. 2a); 2 rounded lobes between spines of basal prolongation of uropod . . . . . *Alima neptuni*
- 2b. Dactylus of claw with 5 teeth (Fig. 2b); 1 rounded lobe between spines of basal prolongation of uropod . . . . . *Alima hildebrandi*
- 3a. Anterolateral angles of carapace spined (Fig. 3a); dactylus of claw with 6 teeth (Fig. 3b); apices of submedian teeth of telson fixed . . . . . → 4
- 3b. Anterolateral angles of carapace unarmed (Fig. 4a); dactylus of claw with 5 teeth (Fig. 4b); apices of submedian teeth of telson movable . . . . . → 6

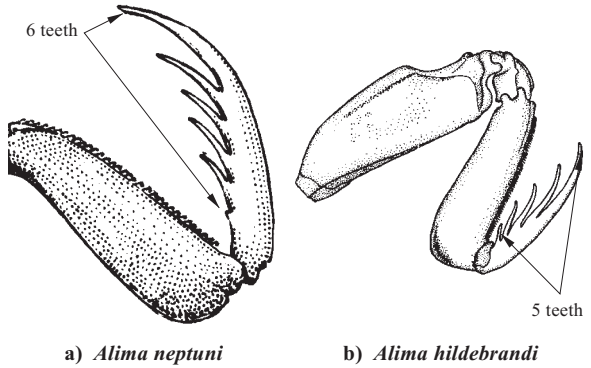


Fig. 2 claw

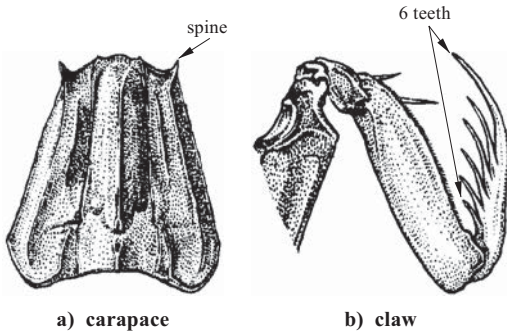


Fig. 3 *Squilla*

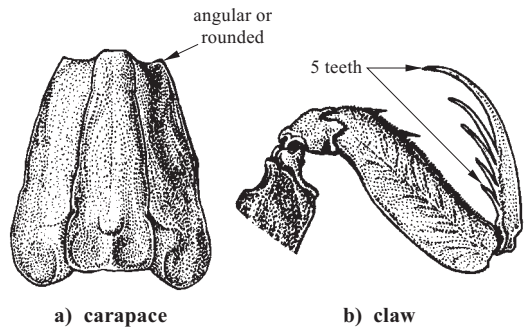


Fig. 4 *Rissoides*

- 4a. Submedian carinae of fifth abdominal somite spineless; without colour spots on telson (Fig. 5a) . . . . . *Squilla aculeata calmani*
- 4b. Submedian carinae of fifth abdominal somites with posterior spine; with distinct colour spots on telson (Fig. 5b and c) . . . . . → 5

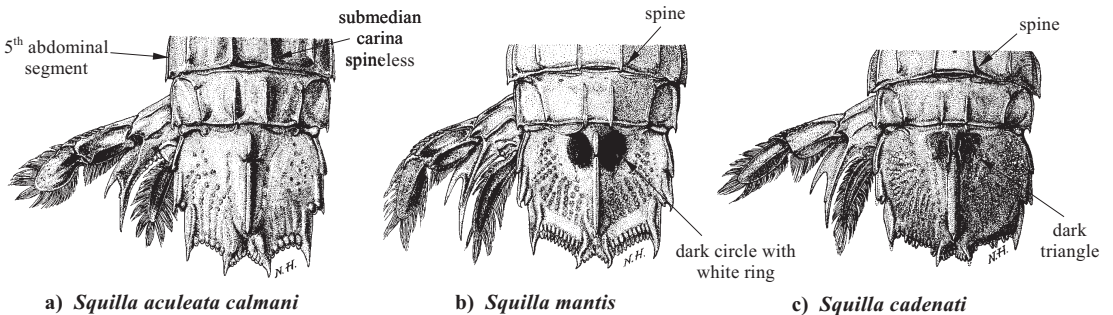


Fig. 5 telson and left uropod



- 5a. Lateral process of fifth thoracic somite directed laterally (Fig. 6a); intermediate carinae of first abdominal somite armed; telson with dark circles surrounded by white ring (Fig. 5b) . . . . . ***Squilla mantis***
- 5b. Lateral process of fifth thoracic somite curved anteriorly (Fig. 6b); intermediate carinae of first abdominal somite unarmed; telson with dark triangles (Fig. 5c) . . . . . ***Squilla cadenati***

- 6a. Basal prolongation of uropod with erect spinules on inner margin (Fig. 7a) . . . . . → 7
- 6b. Basal prolongation of uropod unarmed on inner margin (Fig. 7b) . . . → 8

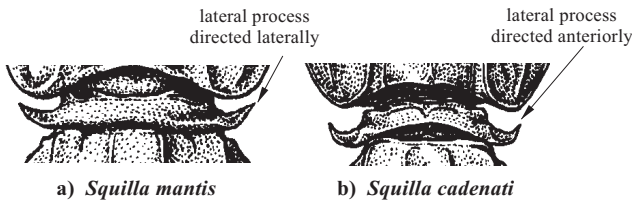


Fig. 6 fifth thoracic somite

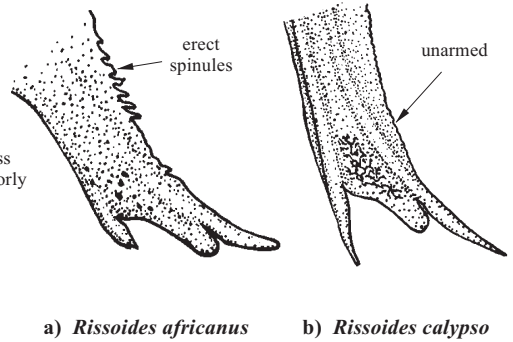


Fig. 7 basal prolongation of uropod

- 7a. Propodus of claw with greatest depth at midlength (Fig. 8a); antennular peduncle longer than carapace and rostral plate combined; lateral process of fifth thoracic somite flattened dorsoventrally, sharp laterally; lateral carinae of fourth abdominal somite spined . . . . . ***Rissoides pallidus***
- 7b. Propodus of claw with greatest depth distally (Fig. 8b); antennular peduncle subequal to or shorter than carapace; lateral process of fifth thoracic somite obliquely flattened, rounded or acute laterally, not sharp; lateral carinae of fourth abdominal somite unarmed . . . . . ***Rissoides africanus***

- 8a. Uropod with 8 movable spines on outer margin (Fig. 9a); antennular peduncle longer than carapace and rostral plate combined . . . . . ***Rissoides calypso***
- 8b. Uropod with 5 to 7 movable spines on outer margin (Fig. 9b); antennular peduncle subequal to or shorter than carapace in length . . . . . ***Rissoides desmaresti***

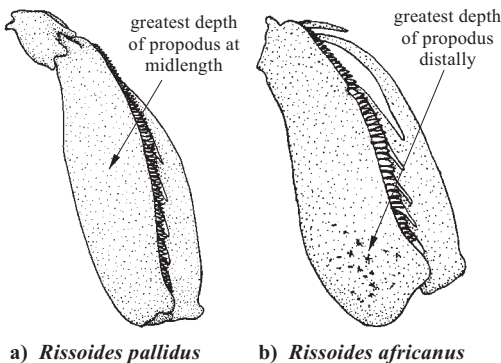


Fig. 8 claw

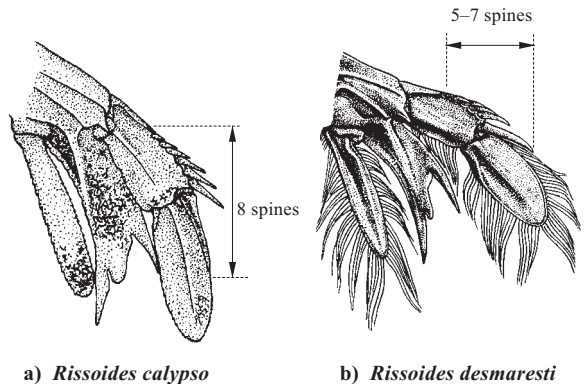



Fig. 9 uropod

### List of species occurring in the area

Classification according to Schram and Müller, 2004.

The symbol  is given when species accounts are included.

*Alima hildebrandi* (Schmitt, 1940).


*Alima neptuni* (Linnaeus, 1768).

*Rissoides africanus* (Manning, 1974).

*Rissoides calypso* (Manning, 1974).

*Rissoides desmaresti* (Risso, 1816).

*Rissoides pallidus* (Giesbrecht, 1910).

 *Squilla aculeata calmani* Holthuis, 1959.

 *Squilla cadenati* Manning, 1970.

 *Squilla mantis* (Linnaeus, 1758).

### References

**Manning, R.B.** 1977. A monograph of the West African Stomatopoda. *Atlantide Report*, 12: 1–181.

**Manning, R.B.** 1981. Stomatopods. In W. Fischer, G. Bianchi & W.B. Scott, eds. *FAO species identification sheets for fishery purposes, Eastern Central Atlantic; Fishing Areas 34, 47 (in part)*. Rome, FAO Vol. VI: pag.var.

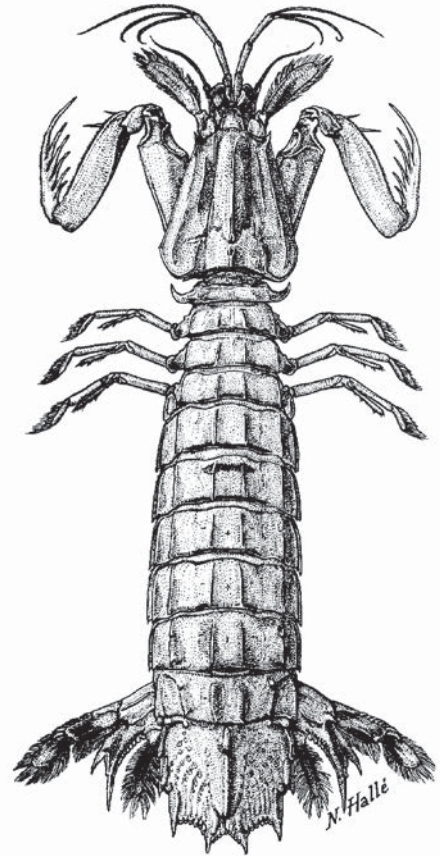
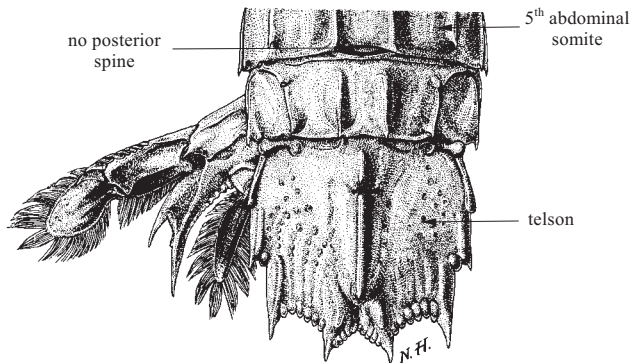
**Schram, F.R. & Müller, H.-G.** 2004. *Catalog and bibliography of the fossil and recent Stomatopoda*. Backhuys Publishers, Leiden, The Netherlands, 1–264 pp.

***Squilla aculeata calmani* Holthuis, 1959**

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

**FAO names:** **En** – Guinean mantis shrimp; **Fr** – Squille guineenne; **Sp** – Galera de Guinea.

**Diagnostic characters:** A moderately sized stomatopod. Body with conspicuous longitudinal ridges; **submedian ridges of fifth abdominal segment lacking posterior spines**; tail segment (telson) with a distinct median ridge. Claws large, armed with 6 spines on the terminal segment. **Colour:** body not conspicuously banded; **telson without prominent dark spots**. In life dusky, khaki green or greyish, with green dorsal ridges on the body; spines of telson pink, and last segment of uropod yellow.



**Size:** Maximum: 15 cm; common to 12 cm.

**Habitat, biology, and fisheries:** A coastal species, common in estuaries. Taken in artisanal fisheries throughout its range. Taken mainly in trawls and beach seines.

**Distribution:** Off West Africa, from Senegal to Angola.

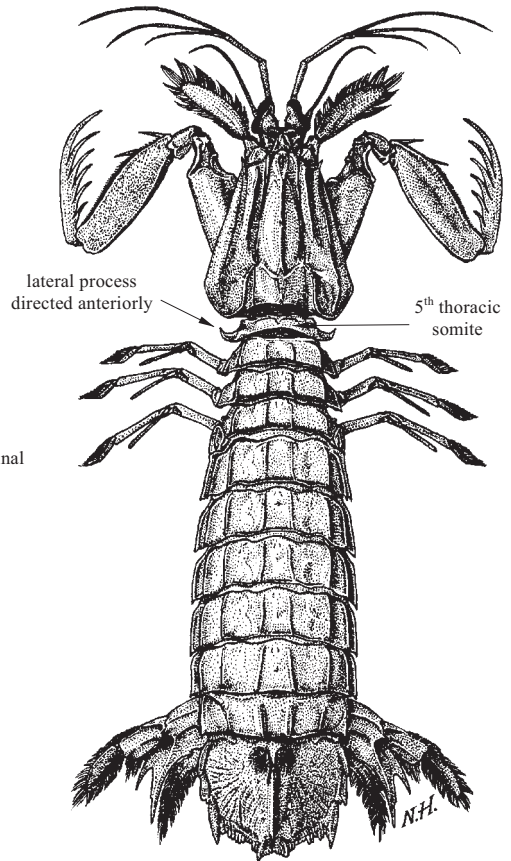
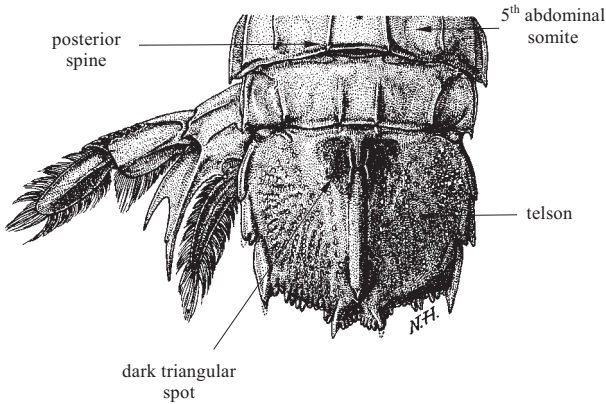


***Squilla cadenati* Manning, 1970**

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

**FAO names:** **En** – Angolan mantis shrimp; **Fr** – Squille angolaise; **Sp** – Galera de Angola.

**Diagnostic characters:** A moderately sized stomatopod. Body with conspicuous longitudinal ridges; **submedian ridges of fifth abdominal segment with posterior spines**; tail segment with a distinct median ridge. Claws large, armed with 6 spines on the terminal segment. **Colour:** never conspicuously banded; **telson with a conspicuous pair of dark triangles anteriorly**, bright red in life.



**Size:** Maximum: 17 cm; common to 15 cm.

**Habitat, biology, and fisheries:** Occurs in depths between 37 and 300 m, commonest below 60 m. Taken incidentally as bycatch throughout its range. Taken mainly in shrimp trawls. Consumed mostly fresh.

**Distribution:** Off West Africa, from Senegal to Angola.

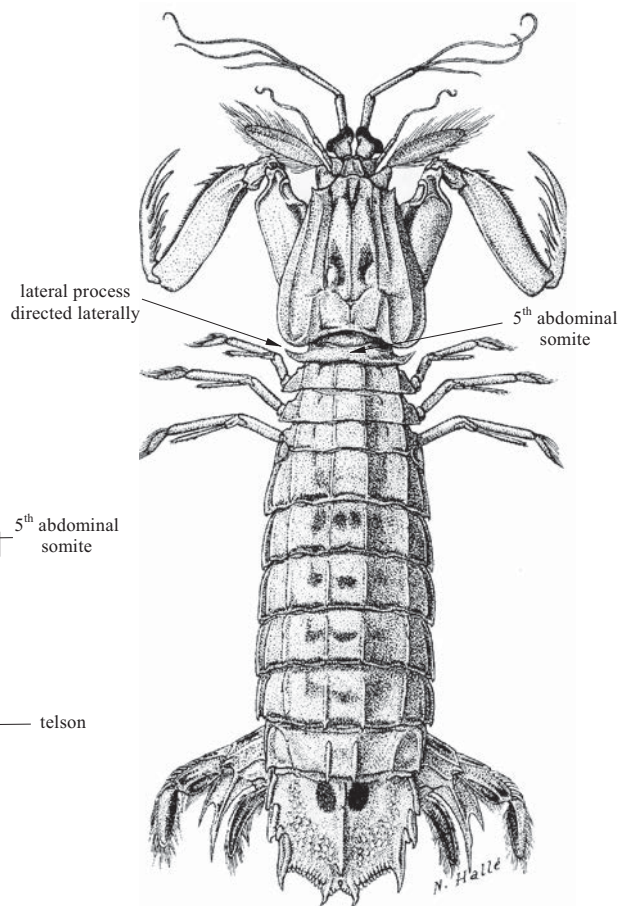
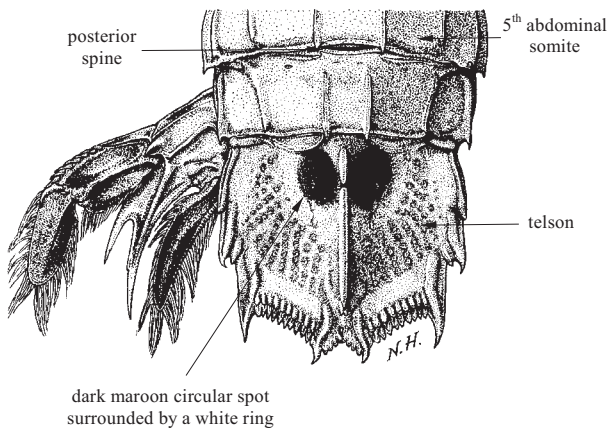


***Squilla mantis*** (Linnaeus, 1758)

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

**FAO names:** En – Spottail mantis squillid;  
Fr – Squille ocellée; Sp – Galera ocelada.

**Diagnostic characters:** A moderately sized stomatopod. Body conspicuously ridged, **submedian ridges of fifth abdominal segment with posterior spines**; tail segment with a distinct median ridge. Claws large, armed with 6 spines on the terminal segment. **Colour:** body not conspicuously banded, marked with maroon; **telson marked with yellow and with 2 dark maroon circles surrounded by a white ring**.



**Size:** Maximum: 15 cm; common to 12 cm.

**Habitat, biology, and fisheries:** Occurs in sublittoral areas to more than 200 m depth, but generally in 120 m or less. Taken as bycatch throughout its range. Caught mainly with shrimp trawls. Consumed mostly fresh.

**Distribution:** Off West Africa, from Gibraltar to Angola; also found in the Mediterranean.



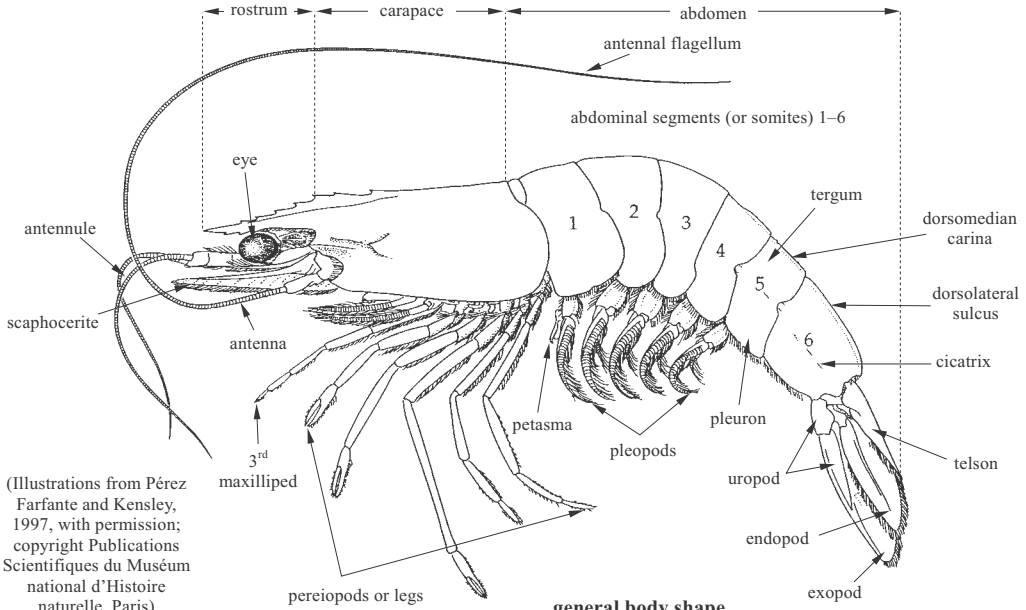


# **SHRIMPS AND PRAWNS**

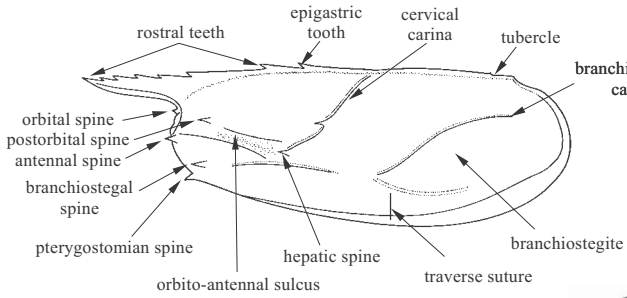
by Charles H.J.M. Fransen

Department of Marine Zoology, Netherlands Centre for Biodiversity – Naturalis, Leiden, The Netherlands

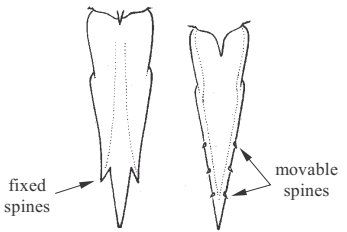
### TECHNICAL TERMS AND MEASUREMENTS



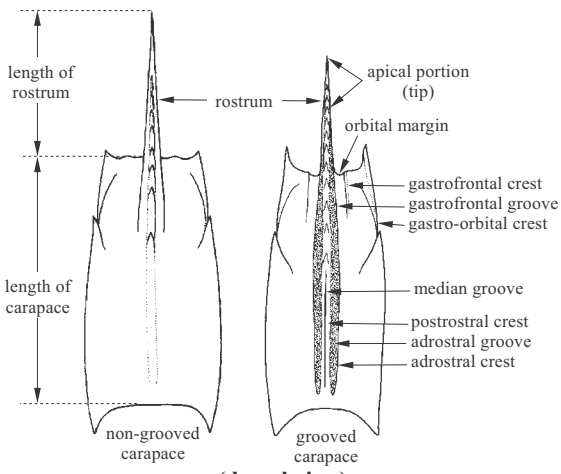
general body shape



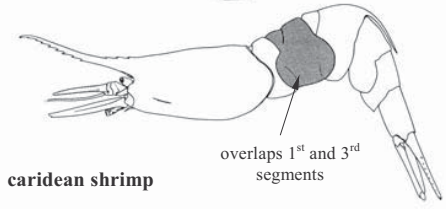
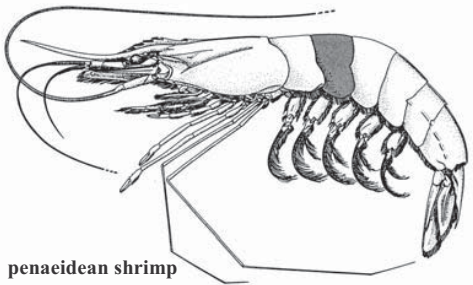
carapace (lateral view)



types of spined telsons



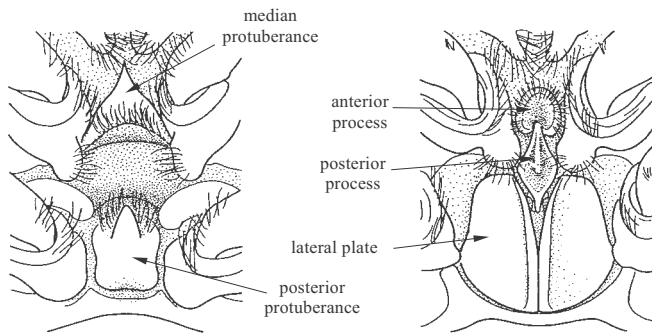
carapace (dorsal view)



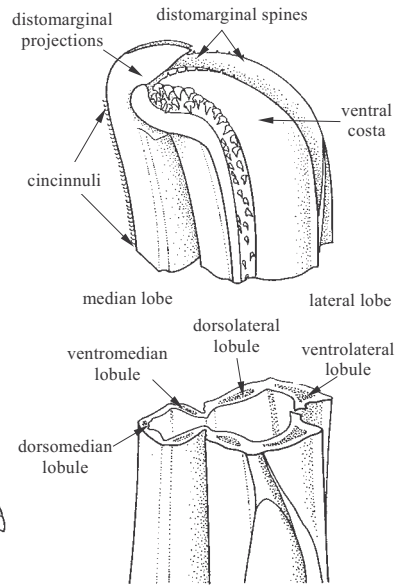
pleura of 2<sup>nd</sup> abdominal segment

overlaps 1<sup>st</sup> and 3<sup>rd</sup> segments

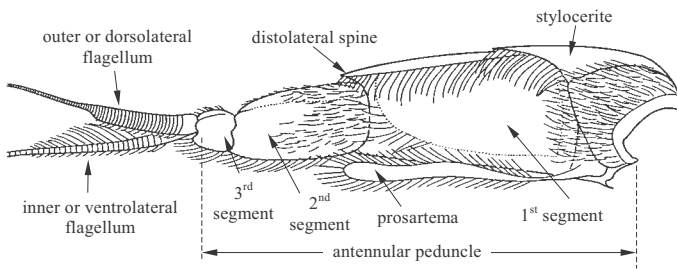




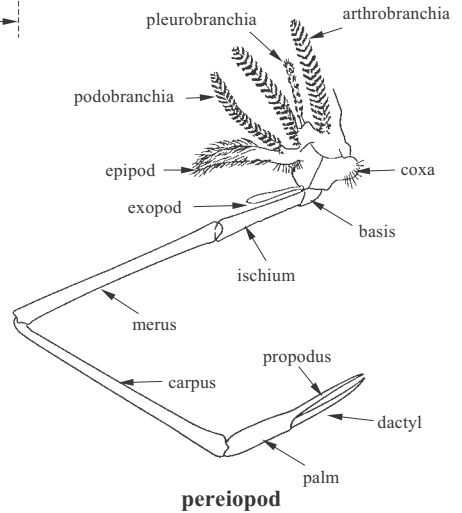
**thelycum**



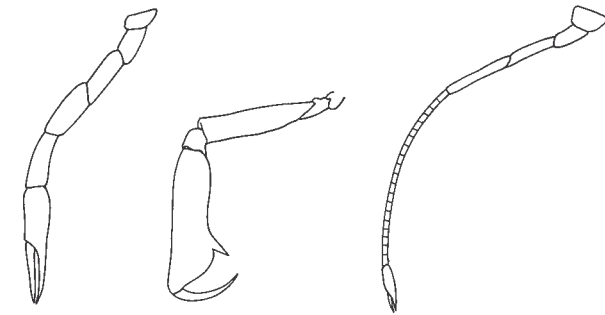
**petasma**



**antennule**

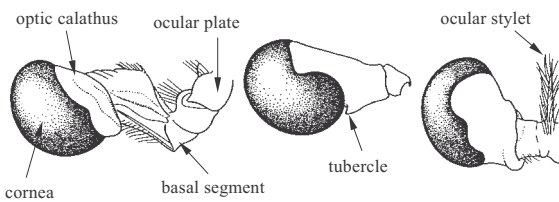


**pereiopod**

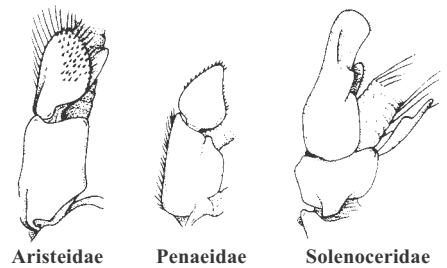


1<sup>st</sup> pereiopod ending in pincers    1<sup>st</sup> pereiopod subchelate    2<sup>nd</sup> pereiopod with carpus subdivided into articles

**schematic illustrations of pereiopods**



**eye**



**Aristeidae    Penaeidae    Solenoceridae**

**types of appendices masculinae on endopods of 2<sup>nd</sup> pair of pleopods**

## 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 the entire eastern Atlantic, a few deepwater shrimp species are exploited commercially and taken by trawlers at depths ranging from 250 to 800 m. Many shrimps are pelagic but the majority by far is 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 species frequent coral reefs, and a few live in association with 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 either 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. The male spermducts 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 segment (between the last pairs of pereopods), where the males deposit the sacs carrying the sperm (spermatophores), 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 remains until the eggs are released. In the males of Penaeidae 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, fourth and fifth pairs of 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 include nauplii, 3 protozoae, and 3 mysis stages. 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, a single female 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.

Altogether there are almost 4 000 species of shrimps and prawns known to date, subdivided into 4 major groups, namely Sergestoidea (112 species), Penaeoidea (about 430 species), Stenopodidea (about 70 species), and Caridea (almost 3 300 species). Although the Caridea comprise the majority of species, only some are abundant enough to be of interest to fisheries. Most of the commercial shrimps and prawns

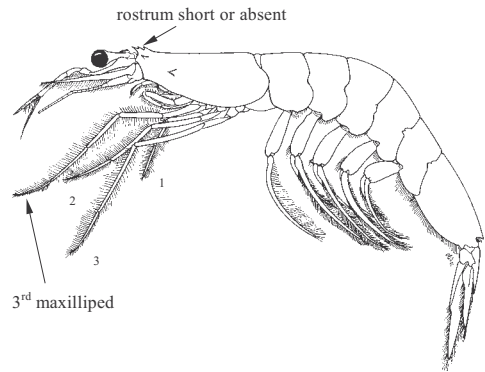
belong to the Penaeoidea. Only slightly more than 350 species are of economic interest, and of these about 100 comprise most of the annual world shrimp catches. A number of countries heavily depend on shrimp exports as a source of foreign currency income. Most of the commercial species in the eastern central Atlantic belong to 4 penaeidean families: Aristeidae, Penaeidae, Sicyoniidae and Solenoceridae, and 6 caridean families: Pasiphaeidae, Nematocarcinidae, Palaemonidae, Hippolytidae, Pandalidae and Crangonidae. The penaeideans are exploited mainly in tropical and subtropical waters, and the carideans in warm as well as temperate seas. Several species of interest to fisheries have recently invaded the fishing area, or were introduced there, like *Penaeus monodon*.

**GUIDE TO MAJOR GROUPS OF SHRIMPS AND PRAWNS OCCURRING IN THE AREA**

**SERGESTOIDEA**

**Sergestoid shrimps**

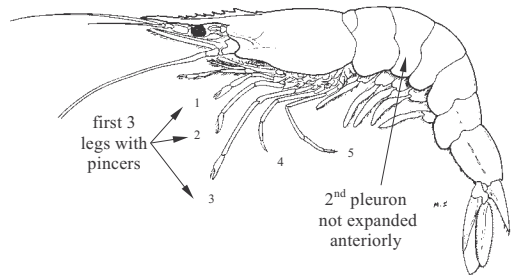
Usually small to microscopic, body strongly compressed laterally, shell rather soft; rostrum and last 2 pairs of legs (pereiopods) reduced (absent in Luciferidae); abdomen with posterior part of pleura (lateral plates) covering anterior part of succeeding pleura; males with large copulatory organ (petasma) on first pair of pleopods (abdominal appendages); generally pelagic, with eggs released directly into the water (eggs carried on second pair of legs in Luciferidae).



**PENAEOIDEA**

**Penaeoid shrimps**

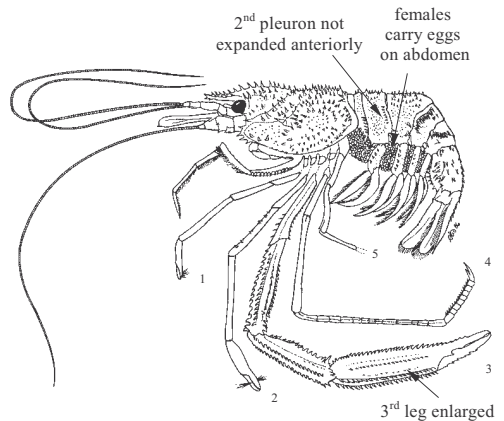
Small to large; all 5 pairs of legs (pereiopods) well developed, with first 3 pairs forming a pincer, none of the pincers particularly large; abdomen with posterior part of pleura (or lateral plates) covering anterior part of succeeding pleura; with large specific copulatory organ on first pair of pleopods (abdominal appendages) in males (petasma), and on posterior thoracic sternites in females (thelycum); eggs released directly into the water, not retained by the females.



**STENOPODIDEA**

**Stenopodid shrimps**

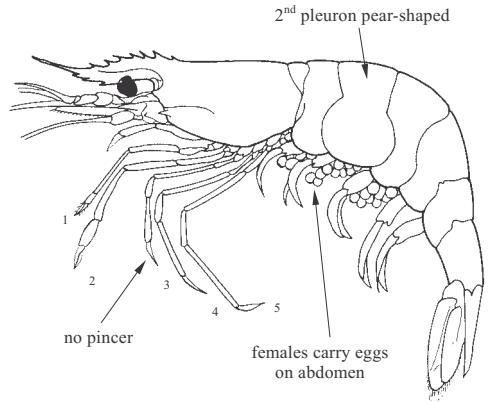
Usually small; all 5 pairs of legs (pereiopods) well developed, with first 3 pairs forming a pincer, third pair huge and massive; abdomen with posterior part of pleura (lateral plates) covering anterior part of succeeding pleura; males and females without large specific copulatory organ on first pair of pleopods (abdominal appendages) or posterior thoracic sternites, respectively; females carry the eggs on the abdomen until hatching.



**CARIDEA**

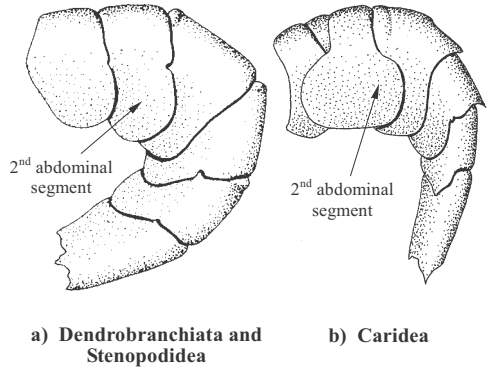
**Caridean shrimps**

Size very small to large; all 5 pairs of legs (pereopods) well developed, the first 2 pairs with or without pincer, but third pair never bearing a pincer; second abdominal pleuron (lateral plate) greatly expanded, pear-shaped and overlapping posterior part of first pleuron and anterior part of third pleuron; males and females without large specific copulatory organ on first pair of pleopods (abdominal appendages) or posterior thoracic sternites, respectively; females carry the eggs under the abdomen until hatching.



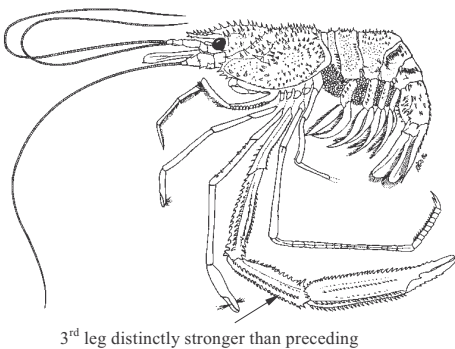
**KEY TO FAMILIES OCCURRING IN THE AREA**

- 1a. Pleura of second abdominal somite not overlapping those of first and third segments (Fig. 1a); third legs with chelae . . . . . → 2
- 1b. Pleura of second abdominal somite overlapping those of first and third segments (Fig. 1b); no chelae on the third pereopod. . **infraorder Caridea** → 10
- 2a. Third leg distinctly stronger than the preceding (Fig. 2); males without petasma . . . . . **infraorder Stenopodidea** → 9
- 2b. Third leg not stronger than the preceding, generally all chelipeds of equal strength; males with petasma . . . . . **suborder Dendrobranchiata** → 3

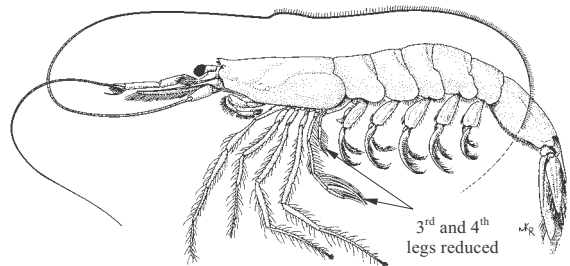


**Fig. 1 abdomen in lateral view**

- 3a. First pair of legs without pincers; fourth and fifth pairs of legs reduced or absent (Fig. 3); rostrum usually short, without or with 1 tooth . . . . . **Sergestoidea** → 4
- 3b. First pair of legs with pincers; fourth and fifth pairs of legs well developed; rostrum usually well developed, armed with teeth . . . . . **Penaeoidea** → 5



**Fig. 2 Stenopodidea**



**Fig. 3 Sergestidae**

- 4a. Head greatly elongated (Fig. 4); branchiae absent; body strongly compressed; antennules with single flagellum; only first 3 pairs of pereiopods present; size very small, about 1 cm body length . . . . . **Luciferidae**
- 4b. Head not particularly elongate (Fig. 3); branchiae present; antennules with 2 flagella; body moderately compressed; fourth and fifth pereiopods present but reduced; adult generally with more than 2 cm body length . . . . . **Sergestidae**
- 5a. Postorbital spine present (Fig. 5) . . . . . **Solenoceridae**
- 5b. Postorbital spine absent . . . . . → 6

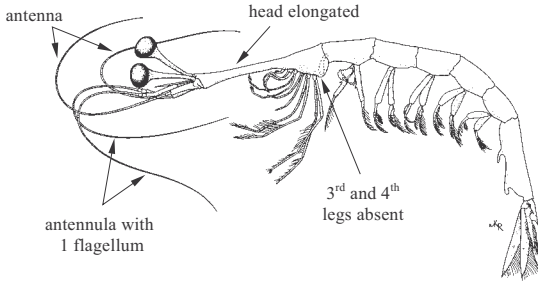


Fig. 4 Luciferidae

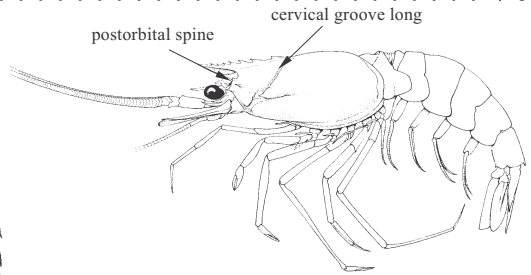


Fig. 5 Solenoceridae

- 6a. Integument rigid and stony; third to fifth pleopods uniramous, lacking endopods (Fig. 6) . **Sicyoniidae**
- 6b. Integument never stony; third to fifth pleopods biramous, with endopods . . . . . → 7
- 7a. One or 2 (occasionally 3) rostral/postrostral teeth (Fig. 7) . . . . . **Benthescymidae**
- 7b. More than 2 rostral/postrostral teeth . . . . . → 8

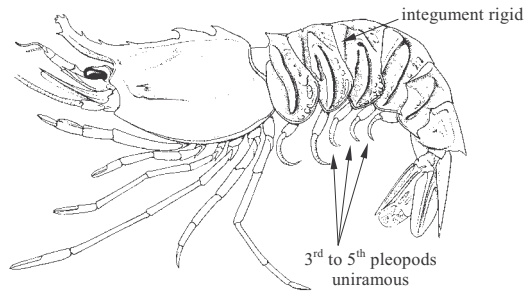


Fig. 6 Sicyoniidae

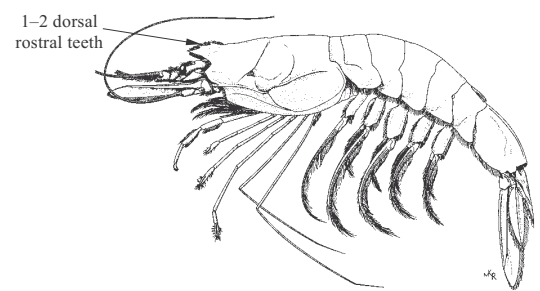


Fig. 7 Benthescymidae

- 8a. Outer and inner antennular flagellum of about the same length (Fig. 8); antennula with prosartema well developed . . . . . **Penaecidae**
- 8b. Outer antennular flagellum much shorter than inner antennular flagellum (Fig. 9); antennula with prosartema reduced to setose boss . . . . . **Aristeidae**

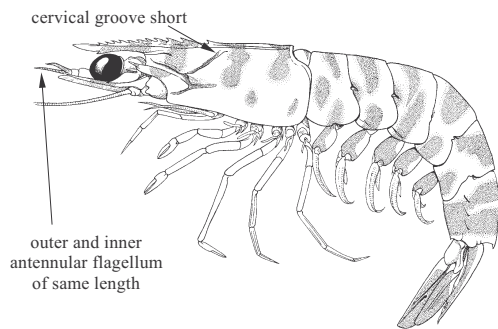


Fig. 8 Penaecidae

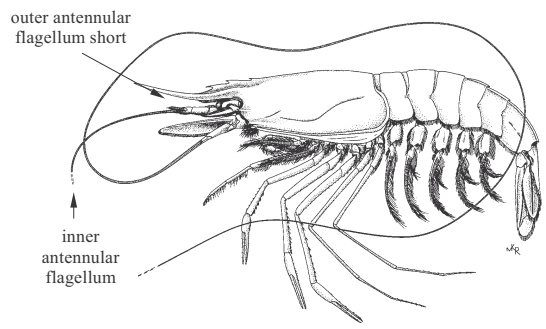


Fig. 9 Aristeidae

- 9a. Body compressed; telson elongate lance-shaped, ending in 2 strong spines, sometimes with a much smaller spine in between; endopod of uropod with 2 longitudinal dorsal ridges; third maxilliped always with a distinct exopod (Fig. 10) . . . . . **Stenopodidae**
- 9b. Body depressed; telson broadly lance-shaped or subquadrangular, ending in 3 to 5 subequal spines; uropodal endopod usually with a single longitudinal dorsal ridge; exopod of third maxilliped sometimes absent or rudimentary (Fig. 11). . . . . **Spongicolidae**

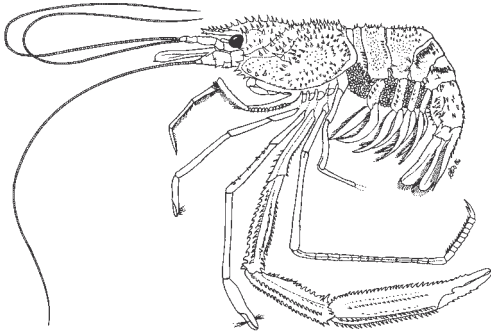


Fig. 10 Stenopodidae

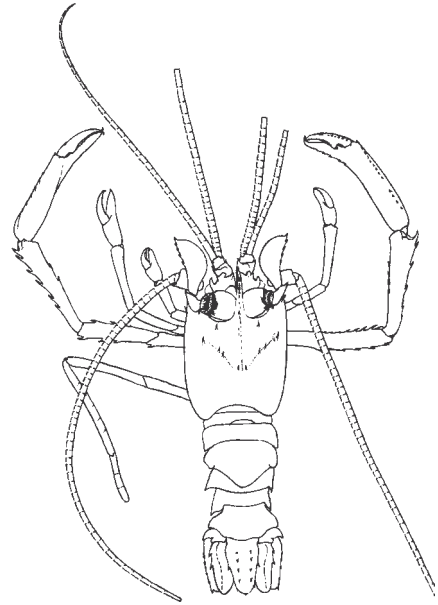
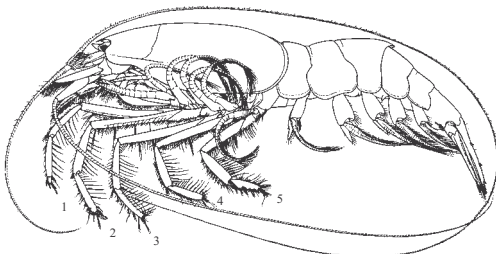


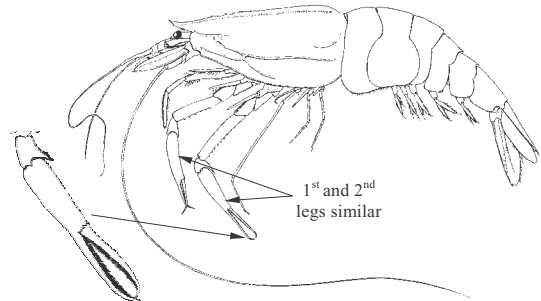
Fig. 11 Spongicolidae

- 10a. None of the pereiopods chelate or subchelate (Fig. 12); third maxilliped composed of 7 free segments . . . . . **PROCARIDOIDEA** → **Procarididae**
- 10b. Chelae present on first or second pereiopods, or on both; third maxilliped with fewer than 7 free segments . . . . . → **11**
- 11a. First pair of pereiopods chelate or simple . . . . . → **12**
- 11b. First pair of pereiopods subchelate or prehensile . . . . . **CRANGONOIDEA** → **23**
- 12a. First and second pereiopods similar (Fig. 13), with long, slender fingers that are pectinate by the presence of long, narrow teeth on the cutting edge; second maxilliped without exopod . . . . . **PASIPHAEOIDEA** → **Pasiphaeidae**
- 12b. Fingers of first and second legs not all pectinate with long slender teeth; those legs often very dissimilar. . . . . → **13**



legs 1-5 without pincers

Fig. 12 Procarididae



pincer pectinate

Fig. 13 Pasiphaeidae

- 13a. Carpus of second pair of legs entire, not subdivided; first pair of legs always with well developed pincers . . . . . → 14
- 13b. Carpus of second pair of legs usually subdivided into 2 or more segments; if not, first pair of legs without pincers . . . . . → 21
  
- 14a. Last 2 segments of second maxilliped implanted side by side at end of antepenultimate segment (Fig. 14); first and second pairs of legs similar; fingers extremely long and slender, more than 10 times as long as high, and more than 5 times as long as the short palm, without teeth but with long hairs . . . . . **STYLODACTYLOIDEA** → **Styloedactylidae**
- 14b. Last segment of second maxilliped attached to penultimate, not touching the antepenultimate; fingers of first and second legs not extremely long . . . . . → 15
  
- 15a. Epipods present on the legs, terminating in a naked appendix which extends vertically far into the branchial chamber posterior to the corresponding pleurobranch; first and second pairs of legs similar (Fig. 15). . . . . **OPLOPHOROIDEA** → **Oplophoridae**
- 15b. Epipods of the legs, if present, not terminating in a long naked appendix . . . . . → 16

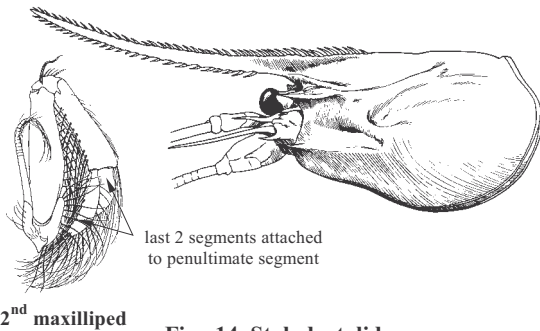


Fig. 14 Styloedactylidae

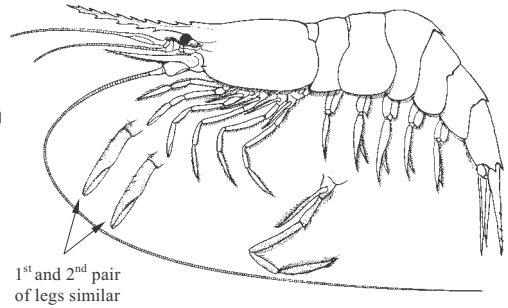


Fig. 15 Oplophoridae

- 16a. First and second legs with the chelae similar; the fingers usually with a dense tuft of setae at the apex (Fig. 16) . . . . . **ATYOIDEA** → **Atyidae**
- 16b. First and second legs without dense tufts of setae at the end of the fingers . . . . . → 17

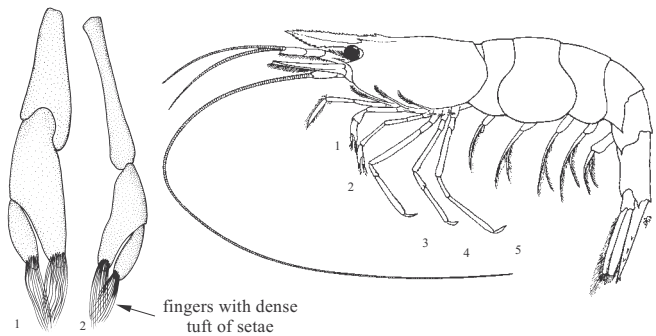


Fig. 16 Atyidae

- 17a. First pair of legs stronger and heavier, though often shorter, than second . . . . . → 18
- 17b. First pair of legs usually more slender than, rarely subequal to second pair . . . . . → 19
  
- 18a. Legs without strap-like epipods; mandible with molar process conical, laminar or vestigial . . . . . **BRESILIOIDEA**
- 18b. Strap-like epipods on at least the 3 anterior pairs of legs; mandible with molar process blunt, subtruncate with ridged grinding surface . . . . . **NEMATOCARCINOIDEA** → 24

- 19a. Anterior 4 pairs of legs with an arthrobranch each; upper antennular flagellum simple, unbranched (Fig. 17); mandible not bifurcate . . . **CAMPYLONOTOIDEA** → **Campylonotidae**
- 19b. No arthrobranches on any of the legs; upper antennular flagellum provided with an accessory branch (Fig. 18); incisor and molar processes of mandible distinctly separated (incisor process sometimes reduced) . . . . . **PALAEMONOIDEA** → **26**

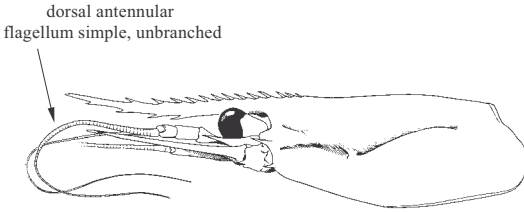


Fig. 17 Campylonotidae

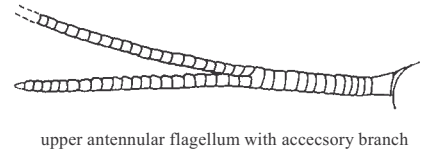


Fig. 18 Palaemonoidea

- 20a. Carapace merging anteriorly into an inflated, indiscrete rostrum (Fig. 19); second leg with fixed finger curving subrectangularly around the short movable finger . . . **PHYSETOCARIDOIDEA** → **Physetocarididae**

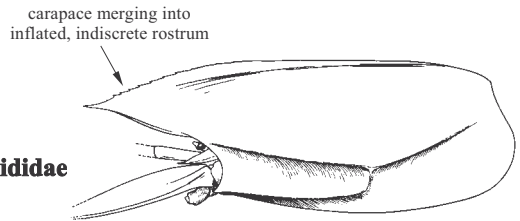


Fig. 19 Physetocarididae

- 20b. Rostrum, if present, discrete, not an inflated extension of the carapace proper; second leg, if present, with conventional pincer . . . . . → **21**

- 21a. Right first leg with pincer, left usually simple, terminating in a plain claw-like dactylus (Fig. 20); if both first legs with pincer, the rostrum shows a distal setose notch formed by a subdistal dorsal tooth; no other teeth on the rostrum; first maxilliped with exopod abutting endite, displacing palp . . . . . **PROCESSOIDEA** → **Processidae**
- 21b. Both first legs either simple or with pincer; first maxilliped with exopod far removed from endite . . . . . → **22**

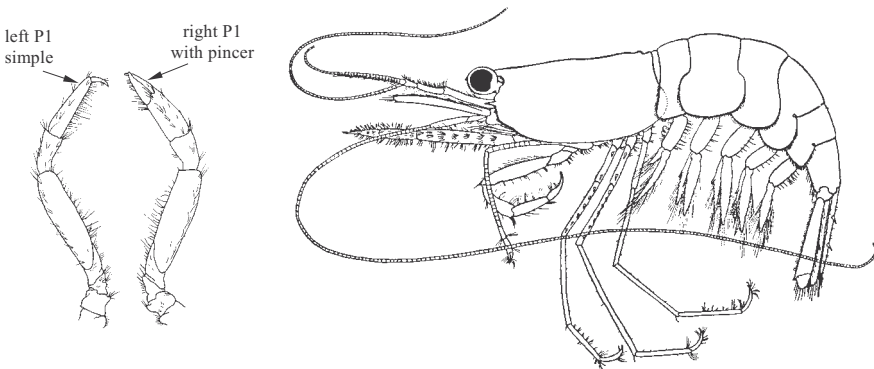
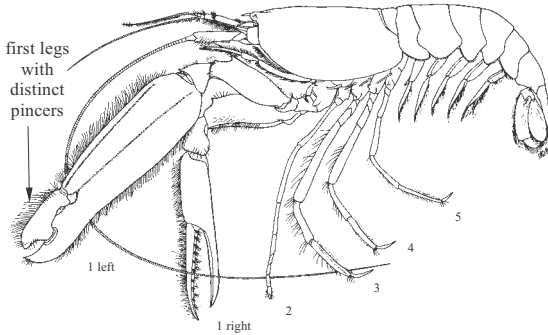


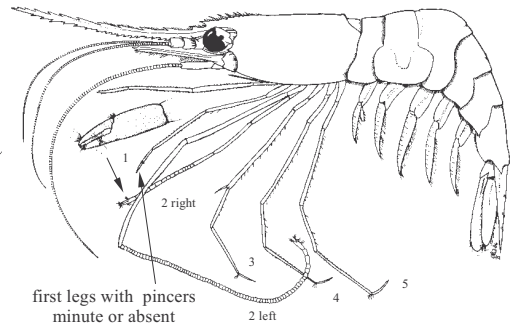
Fig. 20 Processidae



- 22a. First pair of legs distinctly with pincers (Fig. 21) . . . . . **ALPHEOIDEA** → 28  
 22b. First pair of legs with pincers microscopically small or absent (Fig. 22)  
 . . . . . **PANDALOIDEA** → **Pandalidae**

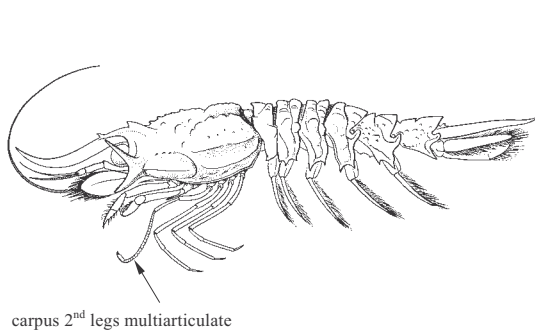


**Fig. 21 Alpheoidea**

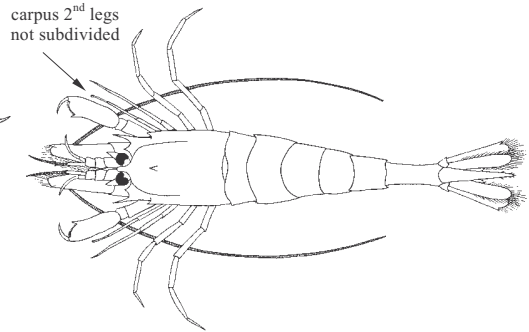


**Fig. 22 Pandalidae**

- 23a. Carpus of second pair of legs multi-articulate (Fig. 23); first leg prehensile, dactylus closing against inner surface of propodus . . . . . **Glyphocrangonidae**  
 23b. Carpus of second pair of legs not subdivided (Fig. 24); first leg subchelate, dactylus closing against the subtruncate distal margin of the propodus which often ends in a spine . . . . . **Crangonidae**

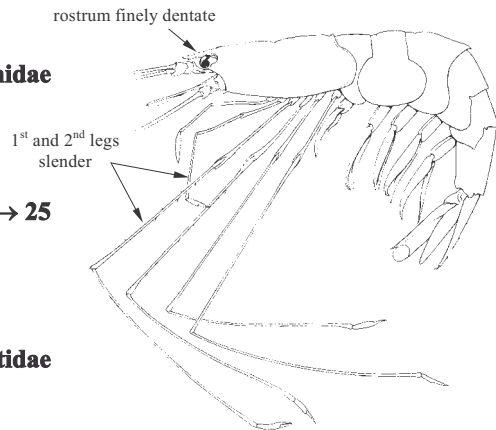


**Fig. 23 Glyphocrangonidae**



**Fig. 24 Crangonidae**

- 24a. Rostrum finely dentate; anterior 2 pairs of legs slender (Fig. 25); fingers not bearing conspicuous long spines . . . . . **Nematocarcinidae**  
 24b. Rostrum grossly dentate; anterior 2 pairs of legs normal (Figs 26 and 27); fingers of the chelipeds with lateral and terminal spines distally, forming a basket-like cage when the fingers are closed . . . . . → 25



**Fig. 25 Nematocarcinidae**

- 25a. Rostrum movable or at least incompletely fused with the rest of the carapace; carapace without lateral ridges; legs without exopods . . . . . **Rhynchocinetidae**  
 25b. Rostrum completely fused with the rest of the carapace, immovable; carapace with 3 strong longitudinal ridges on the lateral surface; all legs with exopods . . . . . **Eugonatonotidae**

rostrum grossly dentate

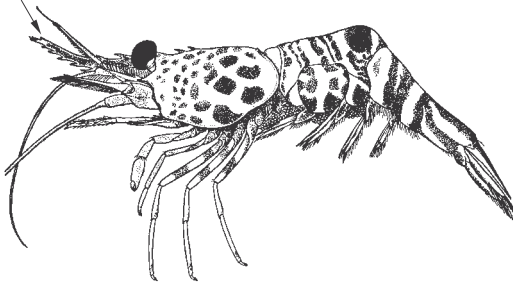


Fig. 26 Rhynchocinetidae

rostrum grossly dentate

lateral ridges

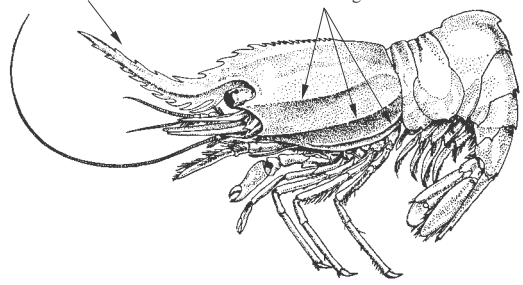


Fig. 27 Eugonatonotidae

- 26a. Third maxilliped slender, leg-like; first maxilliped with caridean lobe of exopod distinctly overreaching endite; mandible with prominent incisor process . . . . . → 27
- 26b. Third maxilliped with antepenultimate segment broadened (Fig. 28); first maxilliped with caridean lobe of exopod not distinctly overreaching endite; mandible with incisor process vestigial or absent . . . . . **Gnathophyllidae**

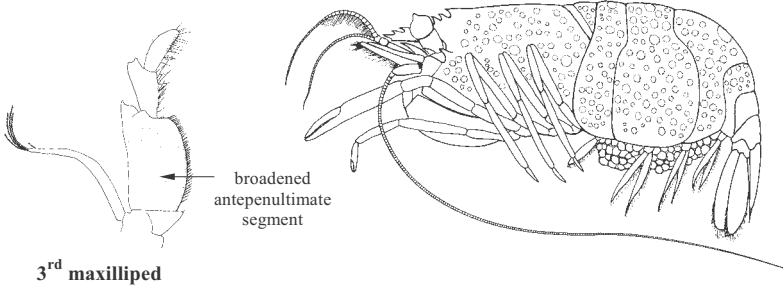


Fig. 28 Gnathophyllidae

- 27a. Second maxilliped with terminal segment broadly ovate, penultimate segment convexly produced mesiad, causing endopod to appear bilobate distally (Fig. 29); first maxilliped with palp broadly ovate . . . . **Desmocarididae**

- 27b. Second maxilliped not markedly bilobate distally; first maxilliped with palp not unusually broad . . . . . → 28

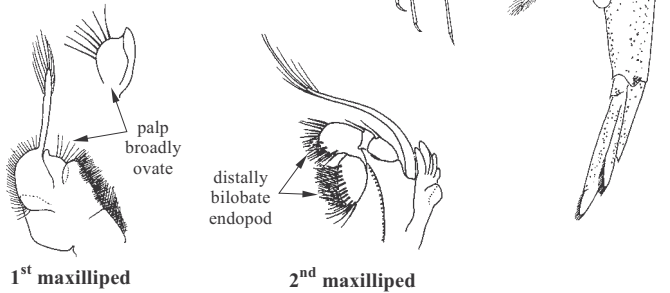


Fig. 29 Desmocarididae

**28a.** First maxilliped with caridean lobe of exopod acutely produced distally (Fig. 30) . . . **Euryrhynchidae**  
**28b.** First maxilliped with caridean lobe of exopod not acutely produced distally (Fig. 31) . . . **Palaemonidae**

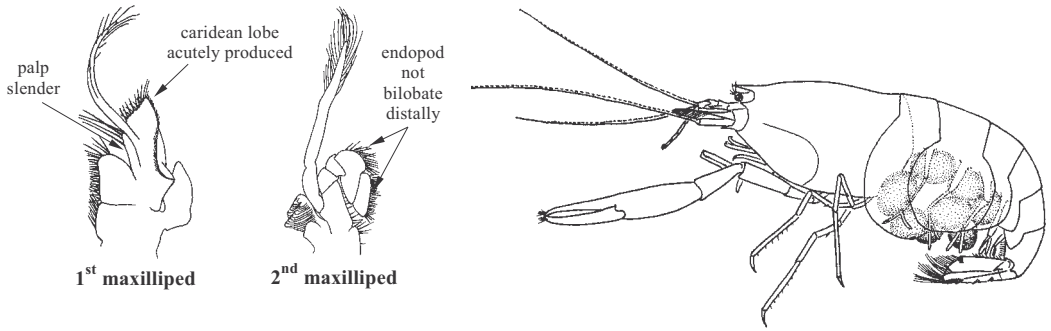


Fig. 30 Euryrhynchidae

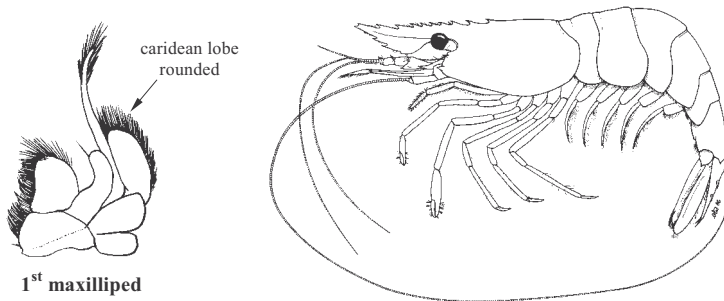


Fig. 31 Palaemonidae

**29a.** Eyes unusually elongate, reaching nearly to distal end of antennular peduncle; first pair of legs about as robust as second pair (Fig. 32) . . . . . **Ogyrididae**  
**29b.** Eyes normal in shape, short, not reaching beyond end of first segment of antennular peduncle, sometimes covered by carapace; first pair of legs more robust than second pair . . . . . → **30**

**30a.** Eyes often partly or entirely covered by carapace; first pair of legs often unequal and swollen (Fig. 33) . . . . . **Alpheidae**  
**30b.** Eyes free; first pair of legs usually equal, not swollen . . . . . → **31**

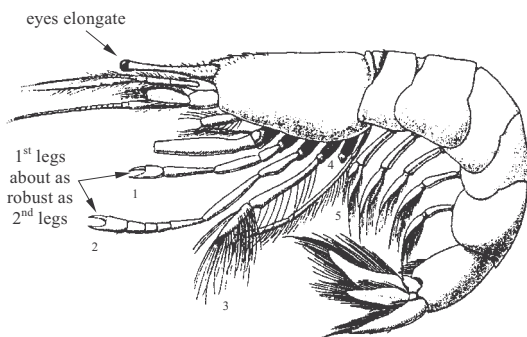


Fig. 32 Ogyrididae

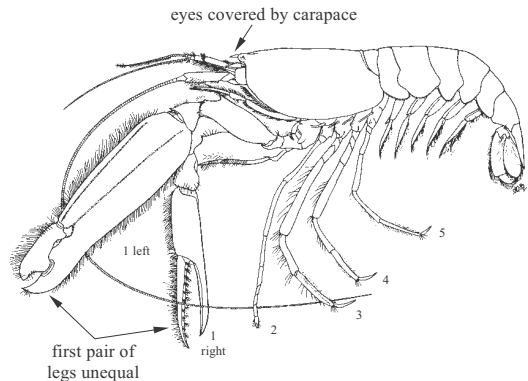


Fig. 33 Alpheidae

**31a.** Carapace armed with subocular tooth posterodorsal to orbital angle (Fig. 34). . . . **Barbouriidae**

**31b.** Carapace without subocular tooth posterodorsal to orbital angle (Fig. 35) . . . . . **Hippolytidae**

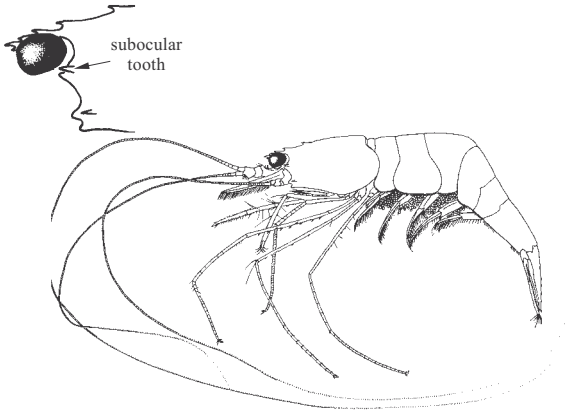


Fig. 34 Barbouriidae

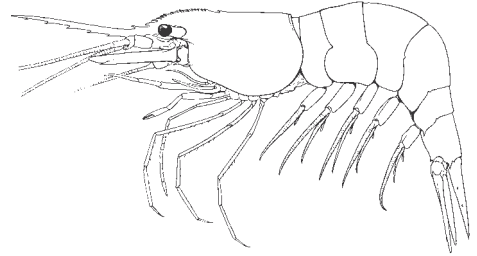



Fig. 35 Hippolytidae

## LIST OF SUBORDERS, INFRAORDERS, SUPERFAMILIES AND FAMILIES OCCURRING IN THE AREA

Classification according to Martin and Davis, 2001

The symbol  is given for those families which are treated further in this contribution. Of these groups the species are listed under those sections.





### Suborder DENDROBRANCHIATA

#### Infraorder PENAEIDEA

##### Superfamily SERGESTOIDEA

LUCIFERIDAE  
SERGESTIDAE

##### Superfamily PENAEOIDEA

 ARISTEIDAE  
BENTHESICYMIDAE  
 PENAEIDAE  
 SICYONIIDAE  
 SOLENO CERIDAE

### Suborder PLEOCYEMATA

#### Infraorder STENOPODIDEA

SPONGICOLIDAE  
STENOPODIDAE

#### Infraorder CARIDEA

##### Superfamily PROCARIDOIDEA

PROCARIDIDAE

##### Superfamily PASIPHAEOIDEA

 PASIPHAEIDAE

##### Superfamily OPLOPHOROIDEA

OPLOPHOROIDAE

##### Superfamily ATYOIDEA

ATYIDAE [mostly freshwater species]

**Superfamily BRESILIOIDEA** [no families used as there is no consensus on their definitions]**Superfamily NEMATOCARCINOIDEA**

EUGONATONOTIDAE



NEMATOCARCINIDAE

RHYNCHOCINETIDAE

**Superfamily STYLODACTYLOIDEA**

STYLODACTYLIDAE

**Superfamily CAMPYLONOTOIDEA**

BATHYPALAEMONELLIDAE

**Superfamily PALAEMONOIDEA**

DESMOCARIDIDAE [Freshwater species]

EURYRHYNCHIDAE [Freshwater species]

GNATHOPHYLLIDAE



PALAEMONIDAE

**Superfamily ALPHEOIDEA**

ALPHEIDAE

BARBOURIIDAE



HIPPOLYTIDAE

OGYRIDIDAE

**Superfamily PROCESSOIDEA**

PROCESSIDAE

**Superfamily PANDALOIDEA**

PANDALIDAE

**Superfamily PHYSETOCARIDOIDEA**

PHYSETOCARIDIDAE

**Superfamily CRANGONOIDEA**

CRANGONIDAE

GLYPHOCRANGONIDAE

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**Suborder DENDROBRANCHIATA**

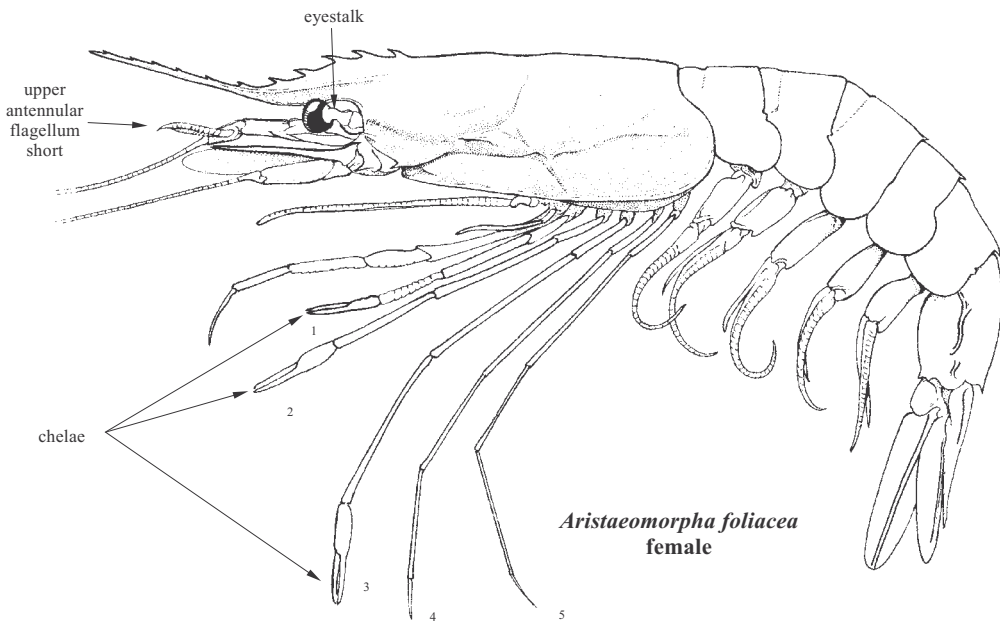
**Infraorder PENAEIDEA**

**Superfamily PENAEOIDEA**

**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; with only 3 dorsal rostral/postrostral teeth (except for *Aristaeomorpha* with 6 to 12 teeth); lacking ventral teeth. **Eyestalks always with a tubercle at middle of inner margins or near base of cornea** (very small in *Aristaeomorpha*). Carapace without postorbital spines; cervical grooves long, extending almost to dorsal midline of carapace. Upper antennular flagellum short. **First 3 pairs of legs with chelae, third pereopod longest.** Two well-developed arthrobranchs (concealed under carapace) on fourth leg. Endopods of second pair of pleopods bearing an appendix masculina (in males) and an appendix interna, but no lateral projection. Telson with movable spines. **Colour: typical coloration of deep-sea crustaceans:** body reddish or scarlet, sometimes pale white and with red cross bands on abdomen.

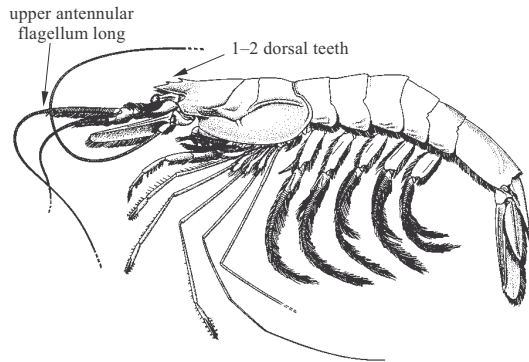


**Habitat, biology and fisheries:** The species in this family usually inhabit deep waters, are benthic and prefer soft bottoms. Some of them are actively fished in the area because of their large size (up to 33 cm) and high commercial value. The sexes are easily distinguished by the presence of a large copulatory organ (petasma) on the first pair of pleopods (abdominal appendages) of males, while the females have the posterior thoracic sternites modified into a large sperm receptacle process (thelycum) which holds the spermatophores or sperm sacs (usually whitish or yellowish in colour) after mating. The eggs are small and numerous, and are released directly into the water and not retained on the female abdomen. The larvae are planktonic and have the nauplius stage.

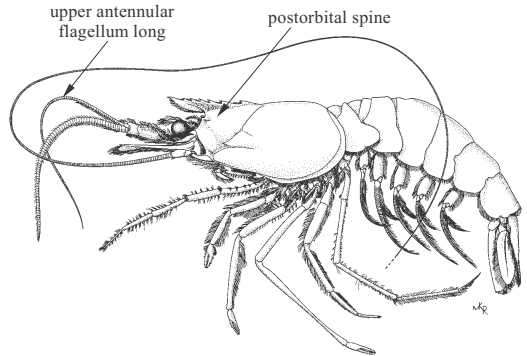
**Similar families occurring in the area**

**Benthescymidae:** only 1 or 2 (occasionally 3) rostral/postrostral teeth; shell soft, thin; upper antennular flagellum long.

**Solenoceridae:** rostrum always armed with more than 3 teeth; either postorbital or postantennal spine present on carapace; upper antennular flagellum long; endopods of second pair of pleopods (in males) with an appendix masculina, an appendix interna and a lateral projection; telson with a fixed spine on each side of tip.

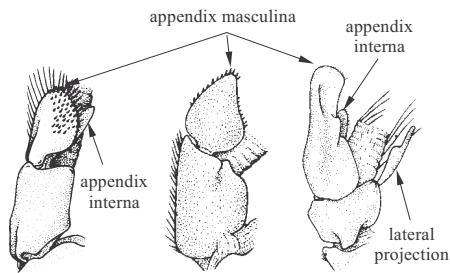


**Benthescymidae**



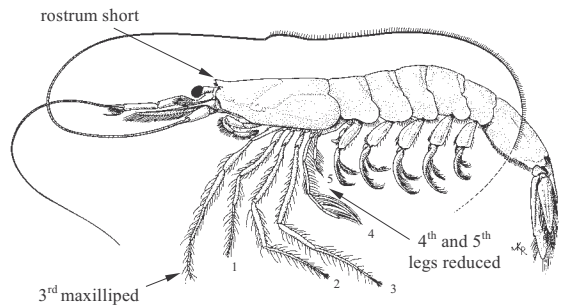
**Solenoceridae**

**Sergestidae:** generally small sized; rostrum very short; body strongly compressed laterally, shell soft, thin; last 2 pairs of legs reduced or absent.



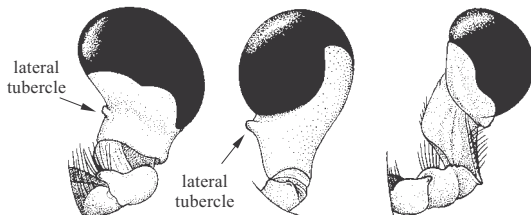
**Aristeidae      Penaeidae      Solenoceridae**

**endopods of 2<sup>nd</sup> pleopod in males**

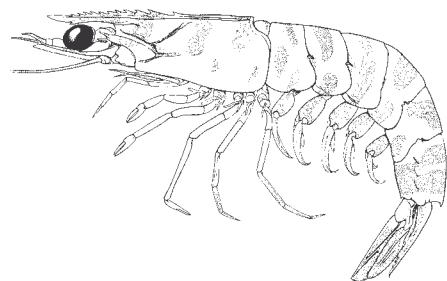


**Sergestidae**

**Penaeidae:** rostrum always with more than 3 dorsal teeth; eyestalks without tubercles on inner margins; cervical grooves short, ending well below dorsal midline of carapace; endopods of second pair of pleopods (in males) with an appendix masculina only; a single, well-developed arthrobranch on base of penultimate thoracic segment (concealed under the carapace).



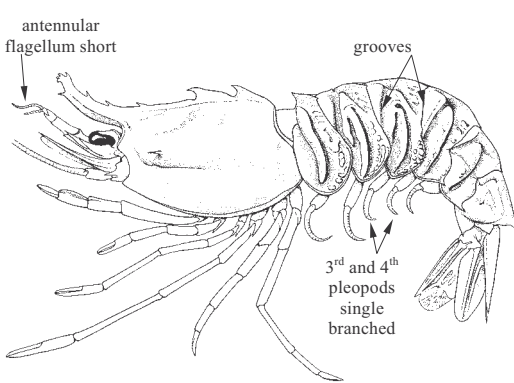
**Solenoceridae      Aristeidae, Benthescymidae      Penaeidae, Sicyoniidae**  
**eyestalks**



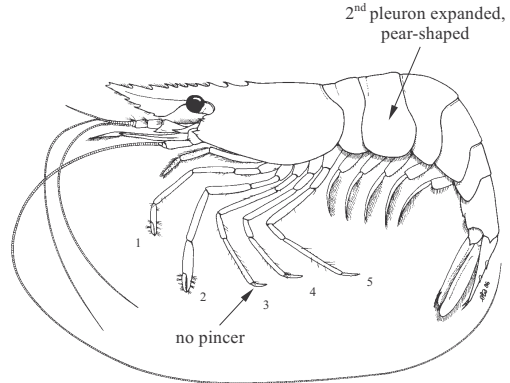
**Penaeidae**

Sicyoniidae: body thick, stony in appearance, integument calcified; cervical groove faint or absent; abdomen with deep grooves and numerous tubercles; upper and lower antennular flagellum short; 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 thoracic segment.

Shrimps of the infraorder Caridea: pleura of second abdominal segment overlapping those of first and third segments; no pincers on third pair of pereiopods.



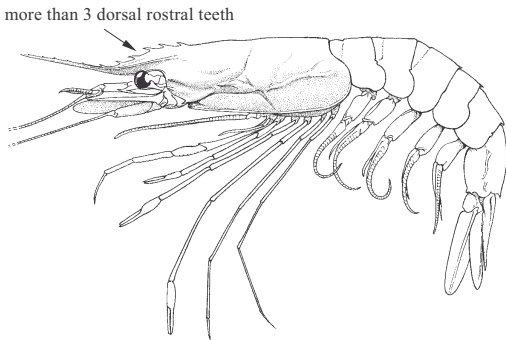
**Sicyoniidae**



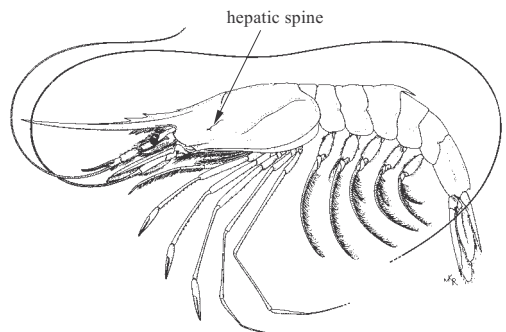
**Caridea**

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

- 1a. More than 3 dorsal rostral/postrostral teeth present (Fig. 1) . . . . . *Aristaeomorpha*
- 1b. Three rostral/postrostral teeth present . . . . . → 2
- 2a. Hepatic spine present (Fig. 2) . . . . . *Hepomadus*
- 2b. Hepatic spine absent . . . . . → 3



**Fig. 1 *Aristaeomorpha foliacea***



**Fig. 2 *Hepomadus tener***



- 3a. Exopods absent from first to fifth pereopods . . . . . → 4  
 3b. Rudimentary exopods present on first to fifth pereopods (Fig. 3a, b) . . . . . *Plesiopenaeus*

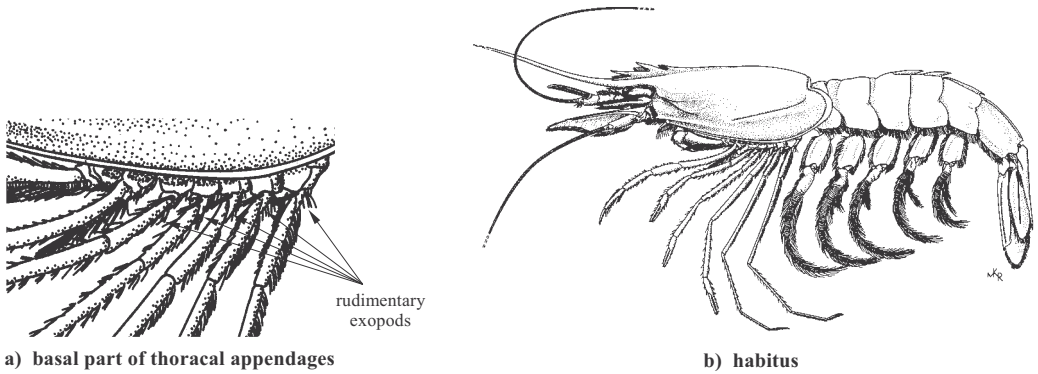


Fig. 3 *Plesiopenaeus armatus*

- 4a. Distal movable spine lacking on merus of first and second pereopods (Fig. 4) . . . . . *Aristaeopsis*  
 4b. Distal movable meral spine present on first and second pereopods (Fig. 5) . . . . . *Aristeus*

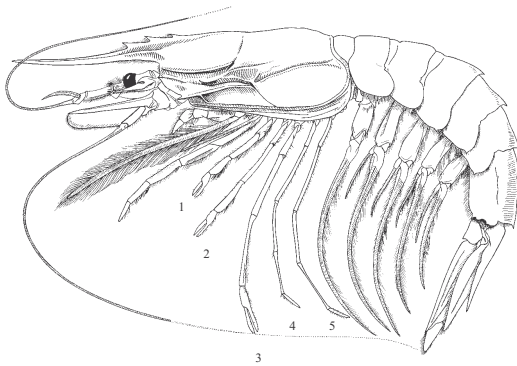


Fig. 4 *Aristaeopsis edwardsiana*

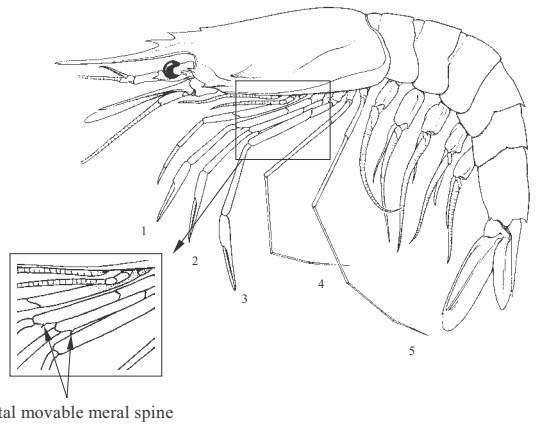



Fig. 5 *Aristeus varidens*

**Key to the species of *Aristeus* in the area**

- 1a. Third abdominal segment with posteromedian tooth; carpus of fifth leg shorter than merus . . . . . *Aristeus antennatus*  
 1b. Third abdominal segment without posteromedian tooth; carpus of fifth leg as long as merus . . . . . *Aristeus varidens*

**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 antennatus* (Risso, 1816).

 *Aristeus varidens* Holthuis, 1952.

*Hepomadus tener* Smith, 1884.

*Plesiopenaeus armatus* (Bate, 1881).

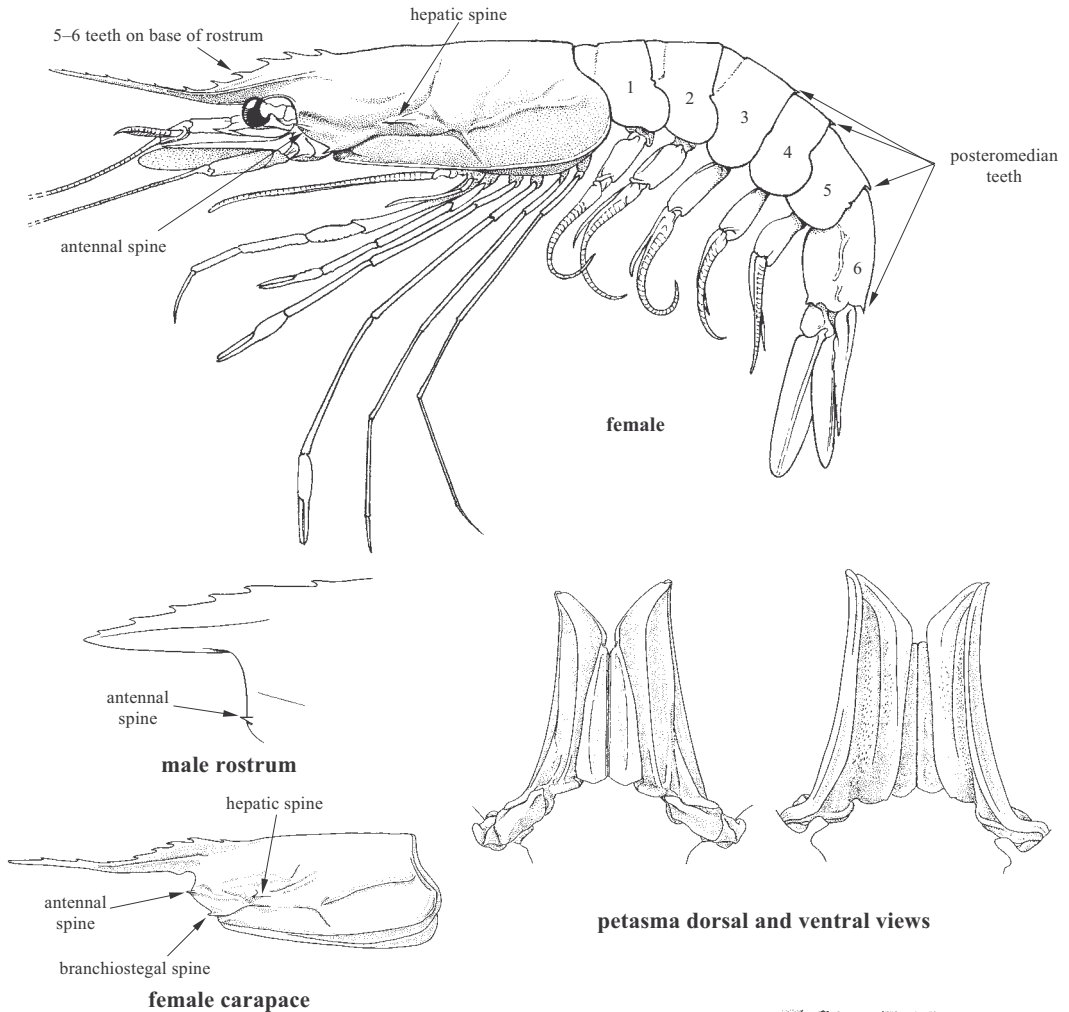
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- Lagardère, J.P.** 1981. Crevettes. In W. Fischer, G. Bianchi & W.B. Scott (eds). *Fiches FAO d'identification des espèces pour les besoins de la pêche. Atlantique centre-est; zones de pêche 34, 47 (en partie)*. Canada Fonds de Dépôt. Ottawa, Ministère des Pêcheries et Océans Canada, en accord avec l'Organisation des Nations Unies pour l'Alimentation et l'Agriculture. Vol. VI: pag. var.
- Pérez Farfante, I. & Kensley, B.F.** 1997. Penaeoid and Sergestoid shrimps and prawns of the world. Keys and diagnosis for the families and genera. *Mémoires du Muséum National d'Histoire Naturelle*, 175: 1–233.

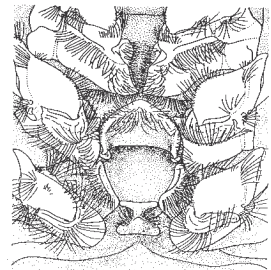
***Aristaeomorpha foliacea* (Risso, 1827)**

**Frequent synonyms / misidentifications:** *Aristaeomorpha rostridentata* (Risso, 1827) / None.

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



**Diagnostic characters:** A large shrimp. **Rostrum** either long and bent upward, its dorsal margin bearing 5 or 6 rather stout teeth along its base, and some small denticles extending almost to tip (females and young males), or much shorter and bearing only the 5 or 6 basal teeth (adult males). Grooves and crests on carapace rather well developed, particularly the dorsal keel (postrostral crest), the antennal crest and the branchiocardiac groove; antennal, hepatic, and branchiostegal spines present. Upper antennular flagellum very short. Abdomen slightly keeled along the dorsal midline of third segment, the keel becoming strongly developed on segments 4 to 6; abdominal segments 3 to 6 with posteromedian tooth. **Colour:** wine red with darker violet reflections on upper side of carapace; eyes black.



**thelycum**

**Size:** Maximum total length 17.0 cm in males and 22.5 cm in females, commonly 13 to 14 cm in males and 17 to 20 cm in females.

**Habitat, biology, and fisheries:** Although the nature of the substrate is apparently not a determining factor of its occurrence, this species is usually caught on muddy and sandy bottoms of the continental slope (beds of *Isidella elongata*), most frequently at depths between 400 and 600 m but occurring as deep as 1 300 m. It seems to have a preference for water around 13.5°C. The reproduction period is rather long, with a peak in summer. A carnivorous species, feeding mainly on euphausiids and other species of crustaceans (mainly shrimp-like decapods). It is caught on trawlable grounds of the continental slope along the coasts of Morocco and the southwestern Sahara. Caught with bottom trawls. Marketed fresh or frozen.

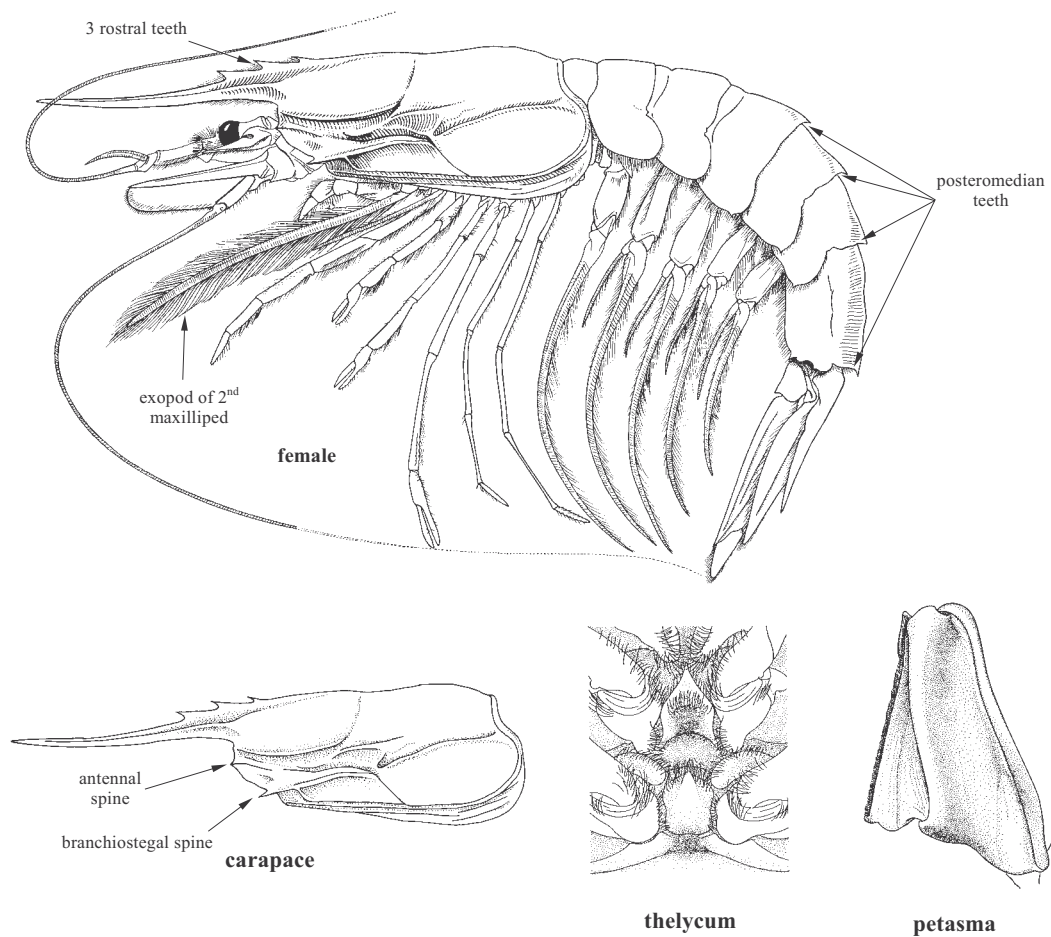
**Distribution:** Eastern Atlantic: Bay of Biscay to Western Sahara; Azores; Madeira; Canary Islands; Mediterranean. Western Atlantic from south of Massachusetts to Straits of Florida; Gulf of Mexico; Caribbean Sea; Venezuela to southeastern Brazil. Indo-West Pacific: off east coast of South Africa;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



***Aristaeopsis edwardsiana*** (Johnson, 1867)

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

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



**Diagnostic characters:** A large shrimp. Rostrum elongated and curved upward in females but short in adult males, with 3 dorsal teeth at base; posterior tooth reduced, located on carapace, anterior 2 teeth on convex portion of rostrum. **Carapace with numerous conspicuous ridges, with antennal and branchiostegal spines but without hepatic spine. Exopod of second maxilliped about twice as long as endopod, fringed by double row of long setae which give it a characteristic feathery appearance. Legs without exopods.** Abdomen with rudimentary longitudinal ridge running mid-dorsally on second segment; well-developed ridge with posteromedian tooth on posterior 4 segments. Telson with 4 pairs of small movable lateral spines. **Colour:** bright red, more intense on the carapace and the back of the abdomen.

**Size:** Maximum total length: 33 cm (females), 19 cm (males).

**Habitat, biology, and fisheries:** Inhabits muddy bottoms of the continental slope. It is most frequently, and sometimes abundantly, found at depths between 400 and 900 m, preferring temperatures between 5° and 8°C. A very active predator of other decapods (*Pasiphaea sivado*, *Plesionika martia*, *Polychela typhlops*), fishes, and to a lesser extent, small crustaceans and cephalopods. Fished commercially by Spanish trawlers in the area Senegal, Guinea, and especially off Congo and Angola. Caught with bottom trawls. Marketed fresh and frozen.

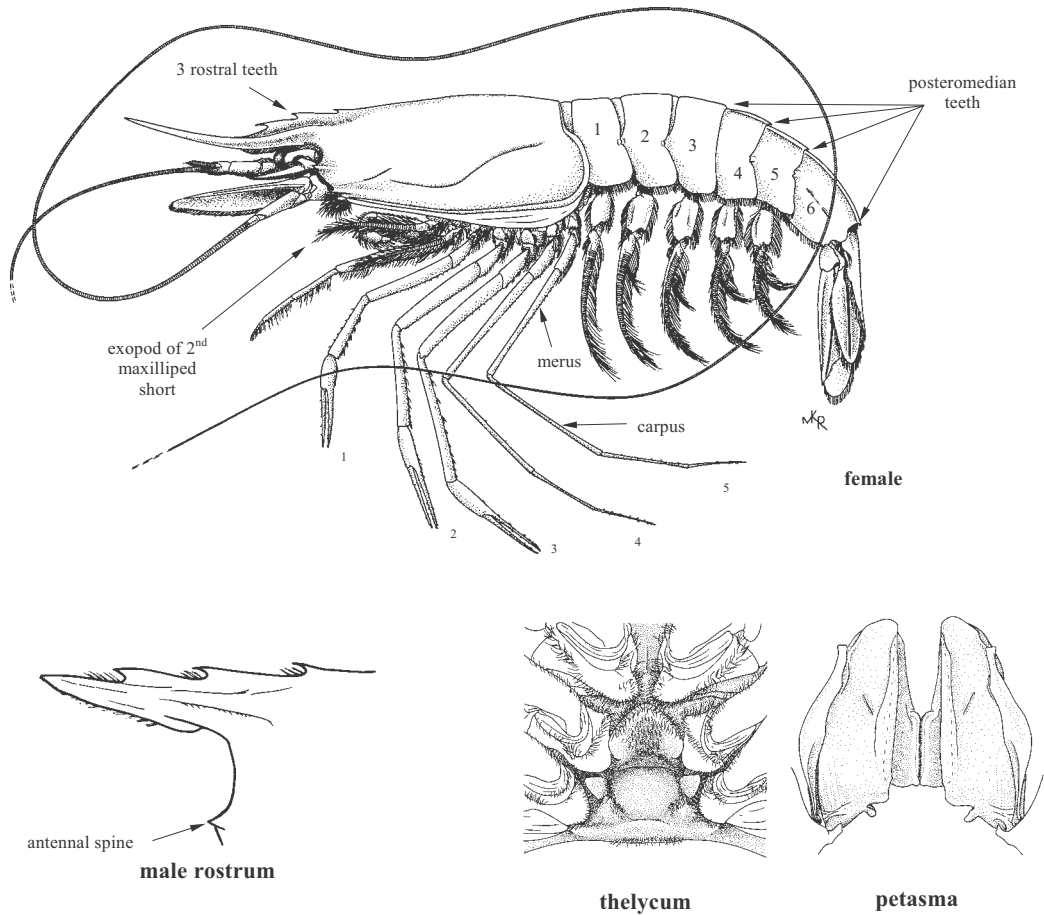
**Distribution:** Eastern Atlantic: Azores, Madeira; Canary Islands; Portugal; Morocco; Western Sahara; to South Africa; not in the Mediterranean. Western Atlantic: Grand Banks (42°42'N) to Gulf of Mexico including Bermuda; Caribbean Sea; French Guiana; and Brazil. Indo-West Pacific: east coast of Africa;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



***Aristeus antennatus* (Risso, 1816)**

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

**FAO names:** En – Blue and red shrimp; Fr – Crevette rouge; Sp – Gamba rosada.



**Diagnostic characters:** A large shrimp. Rostrum with 3 dorsal teeth, short in males, but long, curved upward and pointed in females. **Carapace smooth, with antennal and branchiostegal spines but without hepatic spine.** Exopods of second pair of maxillipeds short, barely reaching distal end of endopod. **Merus of first and second leg with distal movable spine.** **Carpus of fifth legs clearly longer than merus. Median dorsal keel on abdomen rudimentary on posterior half of segment, third segment ending in a small, sharp tooth;** keel complete and much more conspicuous on segments 4 to 6, with posteromedian tooth strong in segments 4 and 5, somewhat reduced in segment 6. **Colour:** nacreous pink profusely interspersed with violet on dorsal regions of carapace and around joints of abdominal segments.

**Size:** Maximum total length 22 cm, commonly between 10 and 18 cm.

**Habitat, biology, and fisheries:** Inhabits muddy bottoms on the continental slope, usually at depths between 400 and 800 m, at temperatures of around 13°C. Spawning takes place in summer. The food consists of small benthic invertebrates, mainly crustaceans and polychaetes; also feeds on carrion. Fishing grounds in the area are on the continental slope along Morocco and the southwestern Sahara. Although the species is rather common, it seems to be nowhere abundant. Commercially important in most countries throughout its range, highly esteemed as food. Caught with bottom trawls; trap fishing has not yielded satisfactory results. Marketed fresh and frozen.

**Distribution:** Eastern Atlantic: from Portugal to Cape Verde Islands; Mediterranean except northern Adriatic, Aegean Seas, and Black Sea. Indian Ocean along East African coast from Natal; South Africa; Mozambique; Zanzibar and Réunion to Maldive Islands.

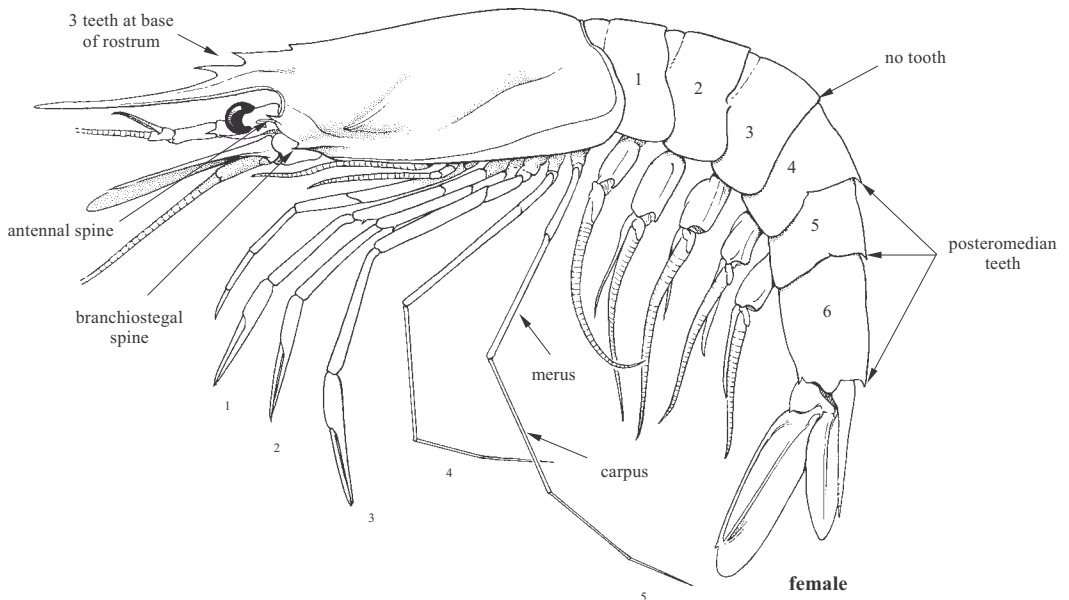




***Aristeus varidens* Holthuis, 1952**

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

**FAO names:** **En** – Striped red shrimp; **Fr** – Gambon rayé; **Sp** – Gamba listada.



**Diagnostic characters:** A large shrimp. Rostrum with 3 dorsal teeth at base; in males it may be either as long as that in females, or rather short (apparently in older individuals). **Carapace slightly keeled, with antennal and branchiostegal spines but without hepatic spine. Merus of first and second leg with distal movable spine. Carpus of fifth pair of pereopods slightly shorter than, or equal in length to merus. Third abdominal segment without posteromedian tooth; posteromedian teeth distinct on segments 4 to 6. Colour:** nacreous white with blotches of violet-blue around abdominal joints and on cephalothorax.

**Size:** Maximum total length: 20 cm (females), 12 cm (males).

**Habitat, biology, and fisheries:** Young individuals are found at depths of 300 m and below, while adults occur between 400 and 600 m, on muddy bottoms. Best trawl yields are obtained at night, suggesting that the species may dig into the substrate by day. The life span is of about 2 years and reproduction begins at the end of the cold season. Feeds on crustaceans, fishes and polychaete worms. Commercially trawled on the continental slope off Senegal, Guinea and Angola. This seems to be the most abundant of the deep-water shrimps off tropical West Africa. Caught with bottom trawls. Marketed mainly frozen.

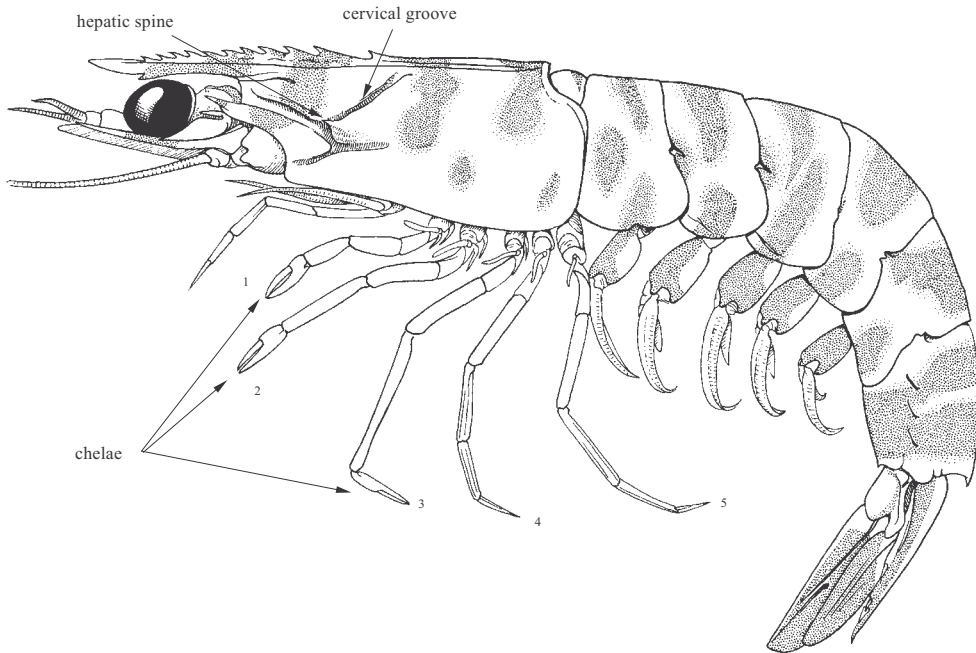
**Distribution:** Known from southwestern Sahara (24°N) southward to Angola (Cabinda) and Namibia (18°S).



## PENAEIDAE

### Penaeid shrimps

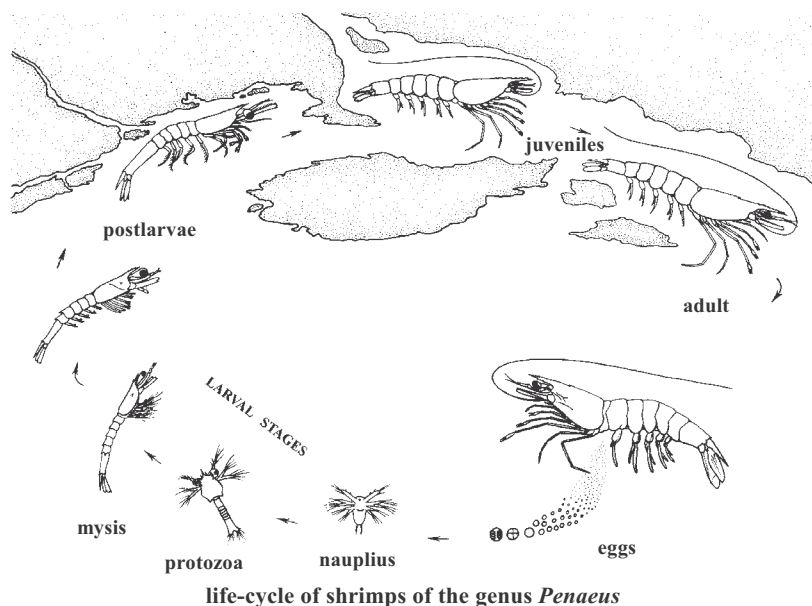
**Diagnostic characters:** Shrimps of medium to large size with well-developed and toothed rostrum which extends beyond distal margin of eyes; no styliform projections on bases of eyestalks and **no tubercles on their mesial (inner) borders**. **Carapace without postorbital spines and with short cervical grooves** ending well below dorsal midline. Last 2 pairs of legs well developed; **third and fourth pairs of pleopods biramous, endopods of second pair of pleopods in males bearing appendix masculina only** (lacking appendix interna and lateral projection). Telson sharply pointed, with or without fixed or movable spines on sides. Only 1, well-developed arthrobranch on penultimate thoracic segment (hidden beneath the carapace), but an additional rudimentary arthrobranch occasionally present.



**Habitat, biology, and fisheries:** Members of this family are usually marine, although juveniles and young are often found in brackish water or estuaries, sometimes with very low salinities. The penaeids in Fishing Areas 34 and 47 occur at depths to about 700 m. Most species are benthic and mainly found on soft bottoms of sand and/or mud, but a few species (e.g. *Funchalia* and *Pelagopenaeus*) are pelagic. Their size ranges from a few to 35 cm body length. The sexes are easily distinguished by the presence of a very large copulatory organ (petasma) on the first pair of pleopods (abdominal appendages) of males, while the females have the posterior thoracic sternites modified into a large sperm receptacle process (thelycum) which holds the spermatophores or sperm sacs (usually whitish or yellowish in colour) after mating. The shape of the petasma and thelycum is often specific and very useful for species identification. The eggs are small and numerous, and are released directly into the water and not retained on the female abdomen. The larvae are planktonic and have the nauplius stage.

The life cycle of species of *Penaeus* is complex (see figure). Adults generally move from shallow coastal waters to offshore and spawn at depths between 10 and 80 m. The eggs hatch within 14 to 24 hours and release very small, simple larvae, the nauplii. The nauplius larva passes through several substages before it metamorphoses into the mysis stage. These larvae are planktonic and are carried by currents toward shore where they arrive as postlarvae; this occurs about 3 weeks after hatching when the animals are 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 shrimps migrate offshore, continue growing and mate, and when they finally reach the spawning grounds, the mature females spawn and the cycle is repeated; most shrimps in these grounds are about 1 year old, rarely older than 2 (or perhaps 3) years old.

At present, 12 genera and 15 species are known from the northeastern Atlantic. Two species, *Marsupenaeus japonicus* and *Penaeus monodon* have recently invaded the area. These species are of interest to aquaculture, have escaped from shrimp farms, and are now being caught in the wild. The family includes the most valuable commercial species of shrimps and accounts for about 80% of the total shrimp production from Fishing Areas 34 and 47.



life-cycle of shrimps of the genus *Penaeus*

### Identification note

The shapes of the male petasma and female thelycum are very important taxonomic characters. However, as the petasma and thelycum are not fully developed in juveniles, a positive identification of juvenile specimens is often difficult. Therefore, it is recommended to use, if possible, adult specimens rather than juveniles when using the keys.

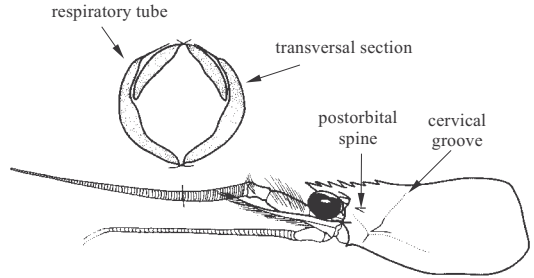
For the differentiation between adult and juvenile males, it should be remembered that, in adult males, the left and right parts of the petasma are very rigid and strongly fused to each other (i.e. very difficult to separate), while in juvenile males the left and right parts of the petasma are either not fused or only weakly united (i.e. easy to separate) and somewhat soft with the sculpture not well defined.

In adult females, the thelycum is clearly sculptured with the ridges and depressions very well marked, while in juvenile females the thelycum has only a shallow sculpture, not well defined.

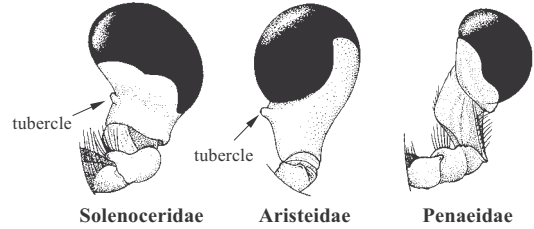
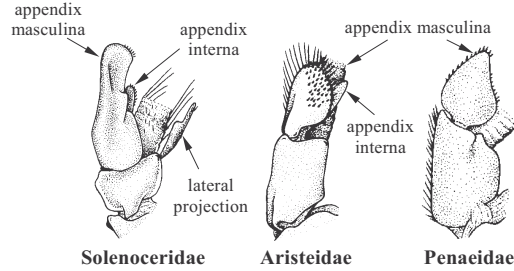
**Similar families occurring in the area**

**Solenoceridae:** eyestalks with a tubercle on their mesial (inner) borders; carapace with postorbital spines; cervical grooves long; antennular flagella forming respiratory tube; endopods of second pair of pleopods in males bearing appendix masculina, appendix interna and lateral projection; telson with a fixed spine on either side of tip; 2 well-developed arthrobranches on either side of penultimate thoracic segment.

**Aristeidae:** eyestalks with a tubercle on their mesial (inner) borders; upper antennular flagellum short; endopods of second pair of pleopods in males bearing appendix masculina and appendix interna, but no lateral projection; 2 well-developed arthrobranches on either side of penultimate thoracic segment.

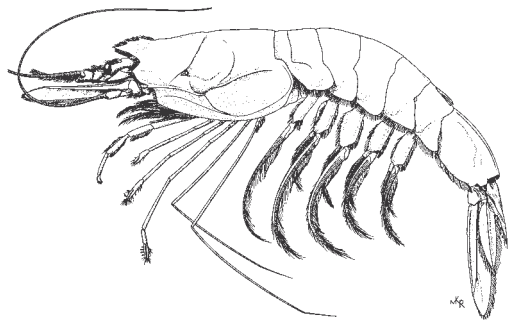


**Solenoceridae**

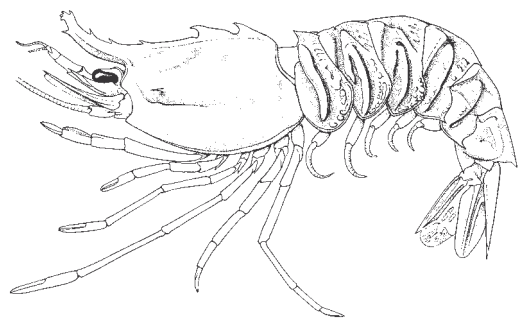


**Benthescymidae:** postorbital spines absent on carapace; integument thin; upper antennular flagellum long; third to fifth pleopods biramous; only 1 or 2 (occasionally 3) rostral/postrostral teeth.

**Sicyoniidae:** body thick, stony in appearance, integument calcified; cervical grooves very faint or absent; abdomen with deep grooves and numerous tubercles; third and fourth pairs of pleopods single-branched; telson usually with a fixed spine on either side of tip.

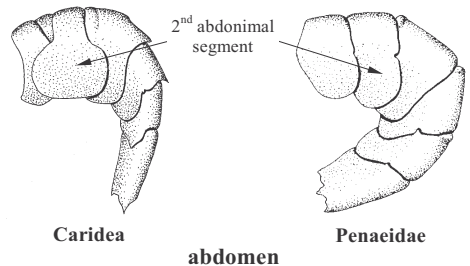


**Benthescymidae**



**Sicyoniidae**

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



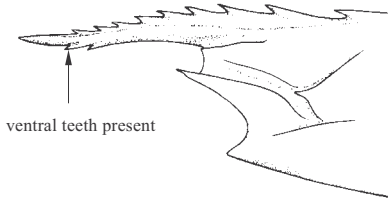
**Caridea**

**Penaeidae**

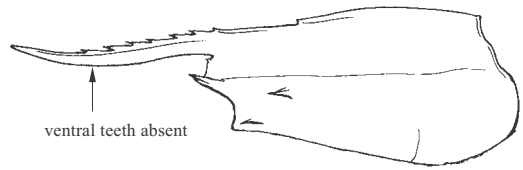
**abdomen**

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

- 1a. Rostrum armed with dorsal and usually also ventral teeth (Fig. 1) (absent only in *Funchalia*); pleurobranchia on somite XIV (last thoracic somite) . . . . . → **2**
- 1b. Rostrum usually armed with dorsal teeth only; no pleurobranchia on somite XIV . . . . . → **7**

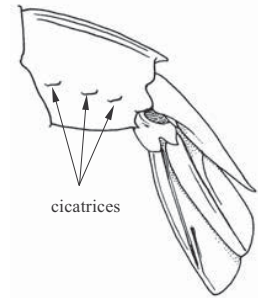


**Fig. 1** *Penaeus*



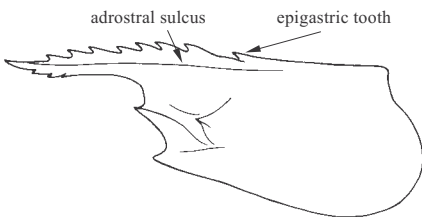
**Fig. 2** *Parapenaeus*

- 2a. Integument glabrous and polished; 3 short, well-defined cicatrices on sixth abdominal somite (Fig. 3). . . . . → **3**
- 2b. Integument setose; single, long (sometimes interrupted) cicatrix on sixth abdominal somite or none. . . . . → **6**

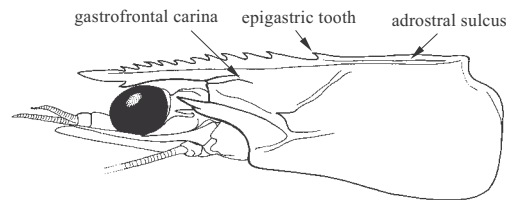


**Fig. 3** *Farfantepenaeus*

- 3a. Adrostral sulcus and carina short, falling distinctly short or extending to about level of epigastric tooth; gastrofrontal carina absent (Fig. 4) . . . . . ***Penaeus***
- 3b. Adrostral sulcus and carina long, reaching much beyond epigastric tooth, usually almost to posterior margin of carapace; gastrofrontal carina present (Fig. 5). . . . . → **4**

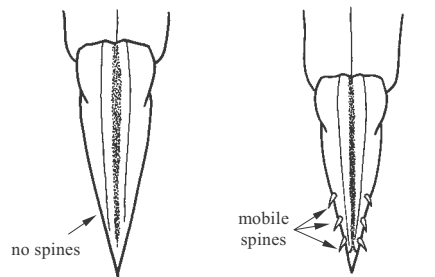


**Fig. 4** *Penaeus*



**Fig. 5** *Melicertus*

- 4a. Gastrofrontal carina not turning anterodorsally upon itself at posterior end; sixth abdominal somite with well-defined dorsolateral sulcus; telson unarmed (Fig. 6a) . . . . . ***Farfantepenaeus***
- 4b. Gastrofrontal carina turning anterodorsally upon itself at posterior end; sixth abdominal somite lacking dorsolateral sulcus; telson armed with 3 pairs of movable lateral spines (Fig. 6b) . . . . . → **5**



**a) *Farfantepenaeus*      b) *Marsupenaeus***

**Fig. 6** telson (dorsal view)

- 5a. Gastrofrontal sulcus not markedly bifid posteriorly; thelycum with pair of plates on sternite XIV shielding sac-like seminal receptacle opening along midline (Fig. 7a); posteriormost pair of spines on telson separated from distal 2 pairs (Fig. 7b). . . . . **Melicertus**
- 5b. Gastrofrontal sulcus markedly bifid posteriorly; thelycum with single plate on sternite XIV infolded laterally, forming pouch opening anteriorly, functioning as seminal receptacle (Fig. 8a); spines on telson at equal distances (Fig. 8b) . . . . . **Marsupenaeus**

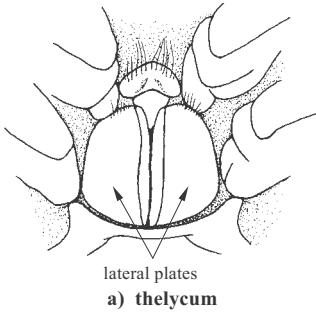


Fig. 7 *Melicertus*

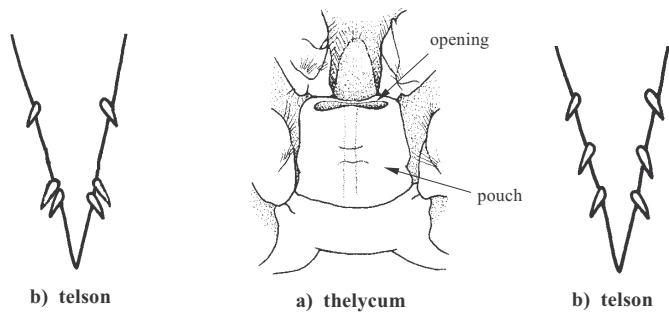


Fig. 8 *Marsupenaeus*

- 6a. Rostrum armed with dorsal teeth only; carapace lacking dorsolateral carina (Fig. 9); incisor processes of mandible extremely elongate, scythe-like and crossing posterior to labrum; petasma asymmetrical with either right or left half longer than opposite . . . **Funchalia**
- 6b. Rostrum armed with dorsal and ventral teeth; carapace with dorsolateral carina (Fig. 10); incisor processes of mandible short, not crossing; petasma symmetrical, both halves of same length. . . . . **Pelagopenaeus**

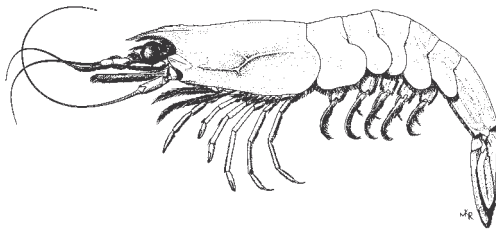


Fig. 9 *Funchalia*

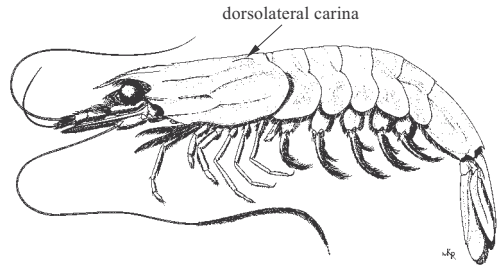


Fig. 10 *Pelagopenaeus*

- 7a. Telson with pair of well-developed fixed subapical spines (may be preceded by lateral movable spines) (Fig. 11a); first segment of antennular peduncle usually bearing ventromesial (parapenaeid) spine . . . . . → **8**
- 7b. Telson without pair of subapical fixed spines, usually with movable lateral spines (Fig. 11b); first segment of antennular peduncle lacking parapenaeid spine . . . . . → **11**

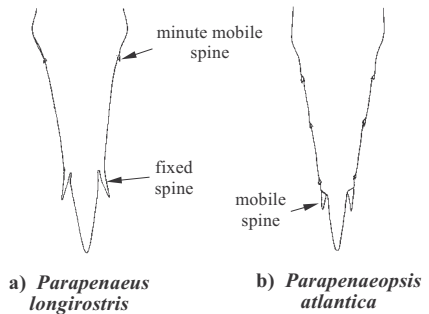


Fig. 11 telson (dorsal view)

8a. Carapace with longitudinal suture (extending at least 0.8 of its length) and transverse suture (Fig. 12); not more than 1 pair of minute lateral spines anterior to subapical spines on telson (Fig. 11a) . . . . . ***Parapenaeus***

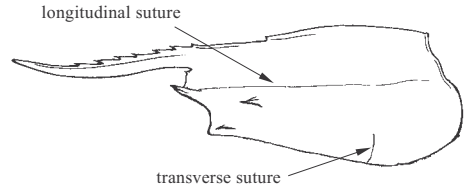


Fig. 12 *Parapenaeus*

8b. Carapace without longitudinal suture (Fig. 13a); 2 or more pairs of spines anterior to subapical spines on telson . . . . . → 9

9a. Third maxilliped, and first and second pereopod with basal spine; petasma asymmetrical (Fig. 13b) . . . . . ***Metapenaeopsis***

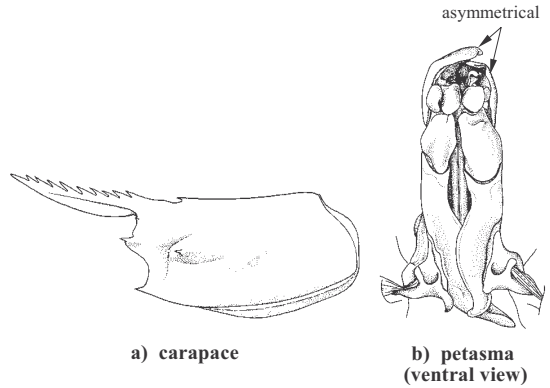


Fig. 13 *Metapenaeopsis*

9b. Third maxilliped and second pereopod without basal spine; petasma symmetrical (Fig. 14a) . . . → 10

10a. Rostrum extending far beyond eye; pterygostomial spine present (Fig. 14b) . . . . . ***Penaeopsis***

10b. Rostrum short, not extending beyond eye; pterygostomial spine absent (Fig. 15) . . . . . ***Trachypenaeopsis***

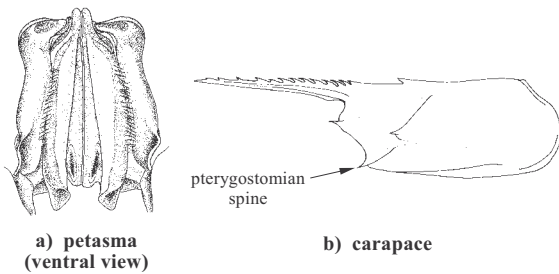


Fig. 14 *Penaeopsis*

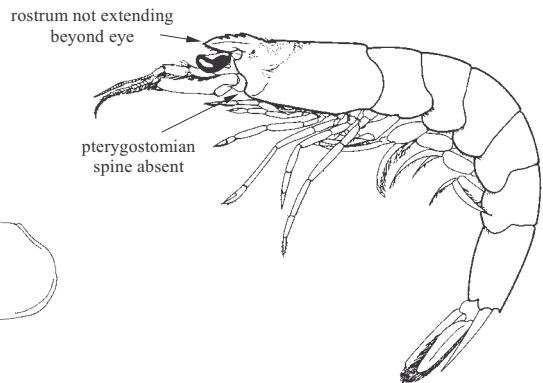


Fig. 15 *Trachypenaeopsis*

- 11a.** Carapace without longitudinal suture; exopods on first maxilliped and first pereopod; petasma with lateral lobes distally produced into extremely long, filamentous processes (Fig. 16b); thelycum with lateral plates curved posteriorly and expanded into bulbous swelling anteriorly . . . . . ***Macropetasma***
- 11b.** Carapace with longitudinal suture; exopods at least on third maxilliped and all pereopods (Fig. 17); petasma with lateral lobes not distally produced into extremely long filamentous processes; thelycum with lateral plates neither strongly curved posteriorly nor expanded into bulbous swelling anteriorly . . . . . ***Parapenaeopsis***

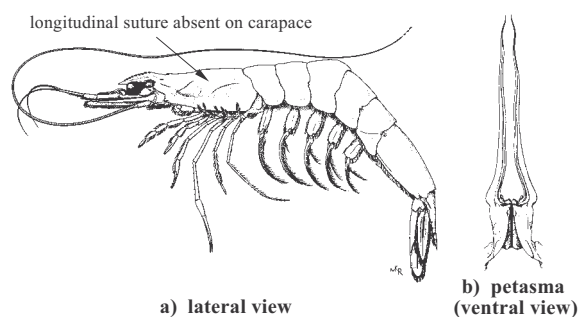


Fig. 16 *Macropetasma*

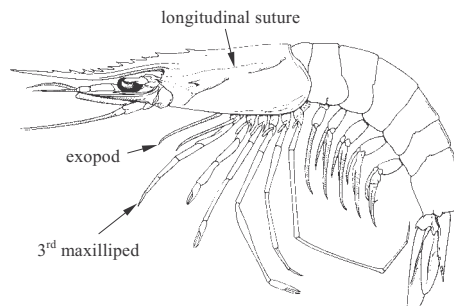



Fig. 17 *Parapenaeopsis*

#### List of species of Penaeidae occurring in the area

The symbol  is given when species accounts are included

 *Farfantepenaeus notialis* (Pérez Farfante, 1967).

*Funchalia danae* Burkenroad, 1940.

*Funchalia villosa* (Bouvier, 1905).


*Funchalia woodwardi* Johnson, 1868.

 *Macropetasma africana* (Balss, 1913).

 *Marsupenaeus japonicus* (Bate, 1888).


 *Melicertus kerathurus* (Forsskål, 1775).

 *Metapenaeopsis miersi* (Holthuis, 1952).

 *Parapenaeopsis atlantica* Balss, 1914.

 *Parapenaeus longirostris* (Lucas, 1846).

*Pelagopenaeus balboae* (Faxon, 1893).

 *Penaeopsis serrata* Bate, 1881.

 *Penaeus monodon* Fabricius, 1798.

*Trachypenaeopsis richtersii* (Miers, 1884).

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Crosnier, A. & Forest, J. 1973. Les crevettes profondes de l'Atlantique Oriental Tropical. *Faune Tropicale*, ORSTOM, Paris, 19: 1–409, figs 1–121.

Lagardère, J.P. 1981. Crevettes. In W. Fischer, G. Bianchi & W.B. Scott, eds. *Fiches FAO d'identification des espèces pour les besoins de la pêche*. Atlantique centre-est; zones de pêche 34, 47 (en partie). Canada Fonds de Dépôt. Ottawa, Ministère des Pêcheries et Océans Canada, en accord avec l'Organisation des Nations Unies pour l'Alimentation et l'Agriculture. Vol. VI: pag. var.

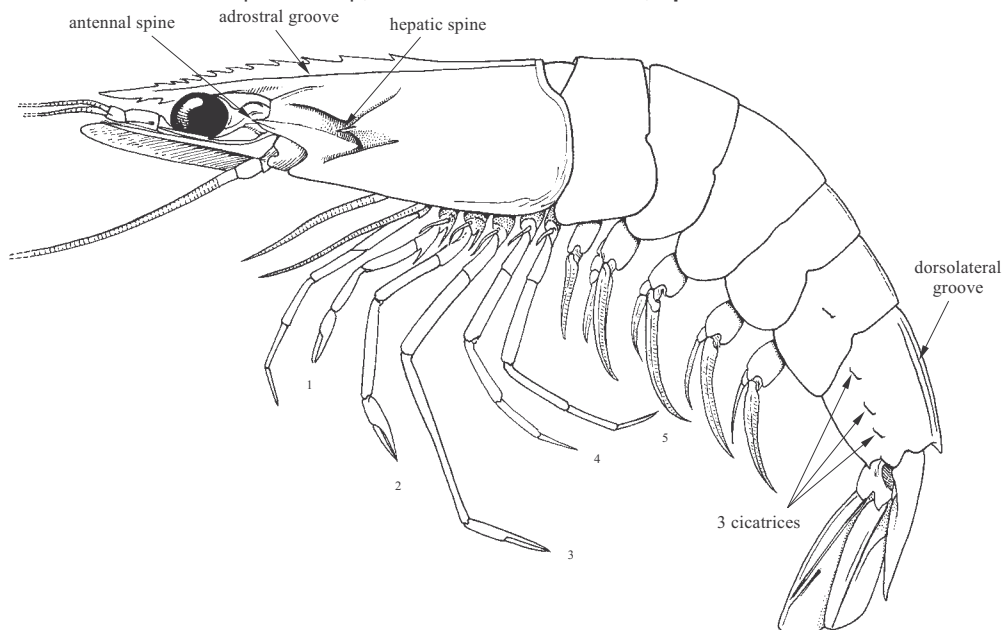
Pérez Farfante, I. & Kensley, B.F. 1997. Penaeoid and sergestoid shrimps and prawns of the world. Keys and diagnosis for the families and genera. *Mémoires du Muséum National d'Histoire Naturelle*, 175: 1–233.



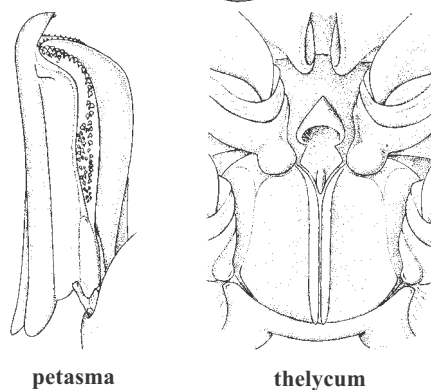
***Farfantepenaeus notialis* (Pérez-Farfante, 1967)**

**Frequent synonyms / misidentifications:** *Penaeus* (*Farfantepenaeus*) *notialis* Pérez-Farfante, 1967 | *Penaeus* (*Melicertus*) *duorarum* Burkenroad, 1939 (A valid species incorrectly referred to as *P. notialis* in the literature); *Penaeus brasiliensis* Latreille, 1817.

**FAO names:** **En** – Southern pink shrimp; **Fr** – Crevette rose du Sud; **Sp** – Camarón rosado sureño.



**Diagnostic characters:** Integument smooth. **Rostrum** usually with 9 teeth (from 8 to 11) on dorsal margin and **2 teeth on ventral margin**. Carapace with antennal and hepatic spines pronounced, lacking orbital and pterygostomial spines; **with adrostral grooves and carina long, extending almost to hind margin of carapace**, the grooves deep and broad posteriorly; postrostral carina well developed as far back as adrostral grooves, with a deep median groove throughout its length; **gastrofrontal carina present**. **Dorsolateral grooves on sixth abdominal segment well defined and broad**, ratio of height of dorsal keel to width of groove usually less than 1.75; **3 cicatrices present laterally**. **Telson unarmed**. Exopods on all maxillipeds and pereopods; pleurobranchia present on somite XIV (last thoracic somite). Antennula lacking parapenaeid spine. Petasma (in males) with short distomedian projections, distal folds not forming auricles, apices of ventral costae joined to adjacent membranous portion; free border of costae armed with spinules, attached border with a group of large teeth. Thelycum (in females) with lateral plates, their anteromedian border divergent; broad posterior process with a long simple (not bifurcate) and exposed median crest. **Colour:** uniform blond in individuals from the West African coast, while in the western central Atlantic, coloration varies considerably with the habitat, from pink to brownish red or lemon yellow. This species often has a characteristic dark blotch at junction of third and fourth abdominal segments.



**Size:** Maximum total length: 23 cm (females), 17 cm (males).

**Habitat, biology, and fisheries:** Inhabits mud or muddy sand bottoms to depths of 100 m, but usually between 10 and 75 m; it is mainly found in temperate (18 to 24°C) water near river mouths and lagoon outlets; juveniles require a stage of about 6 months in brackish water. Active at night, especially in the warmer season, but may also be active by day in turbid waters. The species is subject of important fisheries in West Africa, both locally and by foreign trawlers.

Fishing grounds are the coastal muddy bottoms off Senegal (Casamance, Cayar, Cape Roxo), Guinea, Sierra Leone, Liberia, Côte d'Ivoire, Ghana, Dahomey, Nigeria, Cameroon and Gabon, also exploited in small quantities off Congo and Angola. Caught in lagoons with traps and other artisanal gear (pots, canoe-operated stow-nets, conical nets, small "azui" trawls towed by 2 persons and beach seines) and at sea with traditional and Florida-type bottom trawls (double rig). The species is sweet and fairly firm with an attractive colour both raw and cooked. It softens quickly if left in warm conditions for too long, but is of excellent quality when properly handled and processed. Marketed fresh, frozen (headless and raw), treated with boric acid (Spain), cooked and frozen (France), or smoked and powdered (locally).

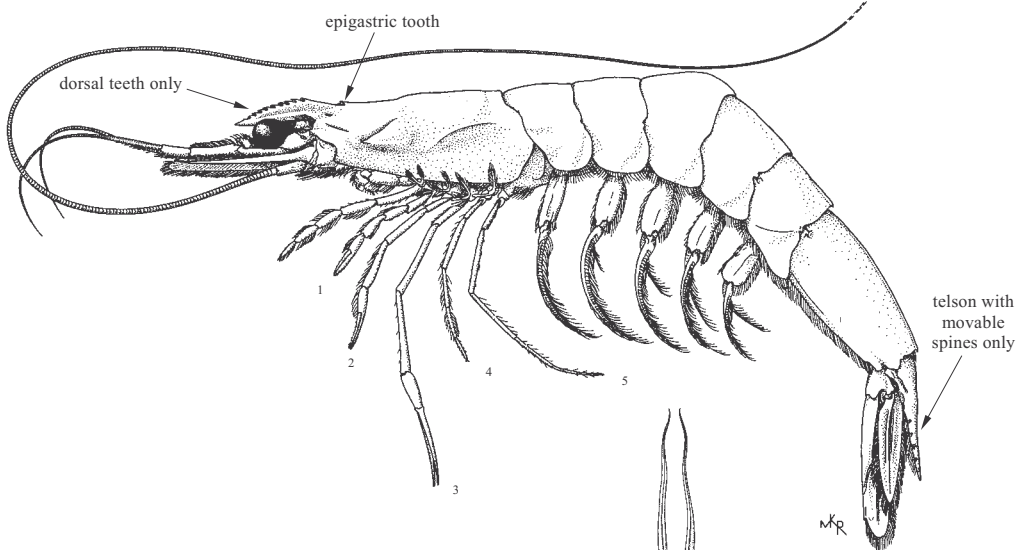
**Distribution:** Eastern Atlantic: from Mauritania (Cape Blanc, 21°N) to Angola. Western Atlantic: Caribbean Sea, including the greater Antilles, Virgin Islands, and the continental shelf from Ascension Bay, Quintana Roo, south along the South American coast down to Rio de Janeiro, Brazil.



***Macropetasma africana* (Balss, 1913)**

**Frequent synonyms / misidentifications:** *Parapeneus africanus* Balss, 1913 / None.

**FAO names:** En – Swimming shrimp; Fr – Crevette nageuse; Sp – Camarón nadador.



**Diagnostic characters:** Integument minutely and sparsely setose. **Rostrum with 8 to 10 dorsal teeth only, no ventral teeth;** epigastric tooth distinctly separated from first rostral tooth. Carapace lacking orbital spine, with small antennal spine, and well-developed hepatic spine; pterygostomian and branchiostegal spines absent; carapace without longitudinal and transverse sutures. Third abdominal somite expanded in caridean humpback fashion; sixth abdominal somite lacking cicatrices; dorsal carina distinct on sixth abdominal segment, feeble on posterior half of fifth abdominal segment. **Telson with 4 pairs of movable lateral spines. Exopods on first maxilliped and first pereiopod;** no pleurobranchia on somite XIV. Antennule lacking parapenaeid spine. **Petasma with lateral lobes distally produced into extremely long, filamentous processes.** Thelycum with lateral plates curved posteriorly and expanded into bulbous swelling anteriorly. **Colour:** well camouflaged, colour pattern depending on background.

**Size:** Maximum total length 6.7 cm (females), 3.3 cm (males).

**Habitat, biology, and fisheries:** Living in marine and estuarine coastal waters to a depth of 28 m. The species forms large aggregates; apparently feeding on detritus.

**Distribution:** Namibia and South Africa (Kunene River to St Lucia).

petasma

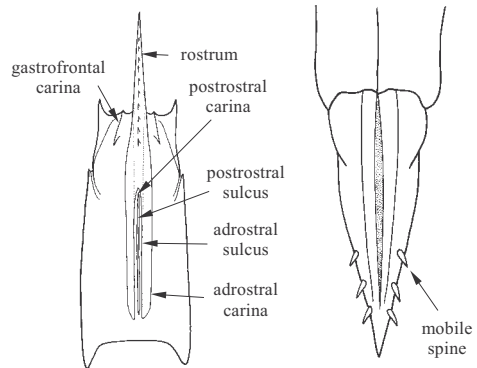
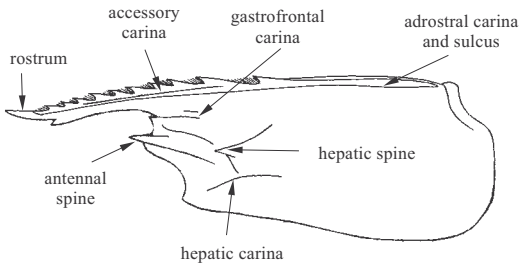
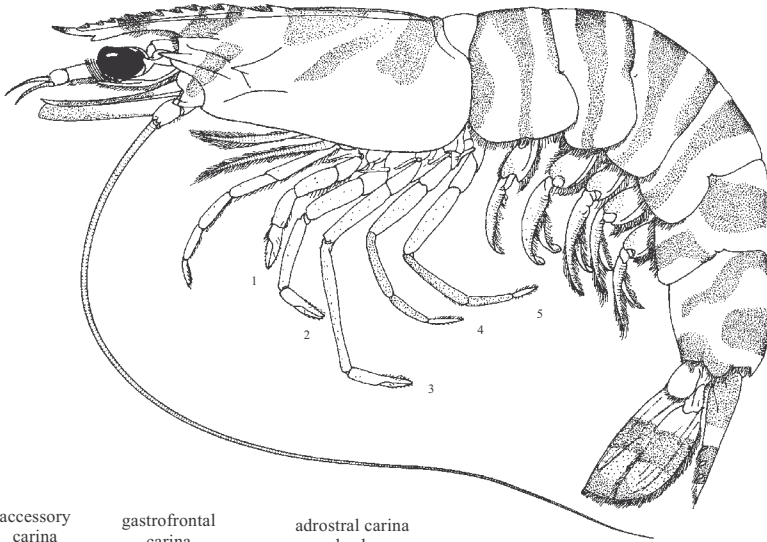
thelycum



***Marsupenaeus japonicus* (Bate, 1888)**

**Frequent synonyms / misidentifications:** *Penaeus pulchricaudatus* Stebbing, 1914 / None.

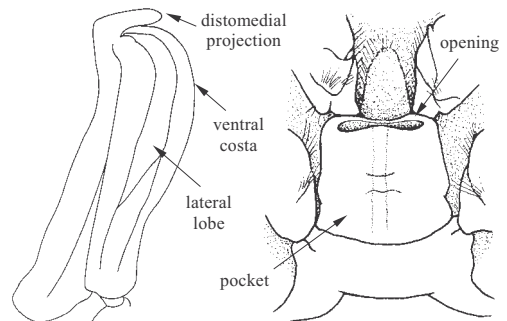
**FAO names:** **En** – Kurumu prawn; **Fr** – Crevette kuruma; **Sp** – Camarón kuruma.



**carapace  
(dorsal view)**

**telson**

**Diagnostic characters:** Integument smooth. Rostrum generally armed with 9 or 10 upper teeth (including those on carapace) and **1 single lower tooth**, lacking distinct accessory crest on the blade. Carapace with spiniform orbital angle; antennal and hepatic spines present, lacking branchiostegal and pterygostomial spines; postocular sulcus absent; postrostral carina and **adrostral sulcus and carina long, almost reaching posterior margin of carapace; gastrofrontal carina turning anterodorsally upon itself at posterior end**, short ramus projecting from base conspicuously separated from carina, **gastrofrontal sulcus markedly bifid posteriorly**; gastro-orbital carina long, almost reaching anterior margin of carapace; orbito-antennal sulcus well defined; cervical carina sharp, accompanying sulcus well marked; hepatic carina and sulcus well marked; longitudinal and transverse sutures absent on



**petasma**

**thelycum**

carapace. **Sixth abdominal somite bearing 3 cicatrices**, lacking dorsolateral sulcus. **Telson armed with 3 pairs of movable lateral spines**. Antennula lacking parapenaeid spine. Basial spines on first and second pereiopods. Exopods on all maxillipeds and pereiopods. Petasma of males symmetrical, semiclosed, with very long distomedian projections overhanging distal margin of costae; ventral costae slightly broadened apically and unarmed; outer surface of lateral lobes not tuberculate. **Thelycum of females with single plate on sternite XIV infolded laterally forming anteriorly open pocket**; anterior and posterior processes forming a triangular, concave plate. **Colour**: body pale yellow to pink with red-brown to dark brown transverse bands; rostrum banded; carapace with anterolateral and dorsal patches (the latter circular in dorsal view) and 2 bands, the anterior one at middle of carapace and leaning anteroventrally; last abdominal band discontinuous; pereiopods yellow proximally, blue or bluish distally, their basal part white; pleopods yellow, tips bluish, white spots at bases; uropods with a large brown median transverse band, proximally white creamish, distally yellow, tip blue and fringe of setae red.

**Size**: Maximum total length: 20 cm (males), 30 cm (females), commonly between 11 and 20 cm.

**Habitat, biology, and fisheries**: Inhabits shelf areas from the coastline to 90 m depth, most abundant between 0 and 50 m; in winter normally between 0 and 20 m. Occurs on sandy or sandy-mud bottoms. Adults are predominantly active at night, burying in the substrate in daytime. Important in trawl fisheries throughout the Indo-West Pacific. Also increasingly important in aquaculture. Trawled in the eastern Mediterranean and cultured in various places in the Mediterranean. Now occurring in the northeastern Atlantic and of potential importance to fisheries there. Caught mainly with otter trawls, drift nets and set gillnets, also taken by stake traps. Marketed mostly fresh and frozen.

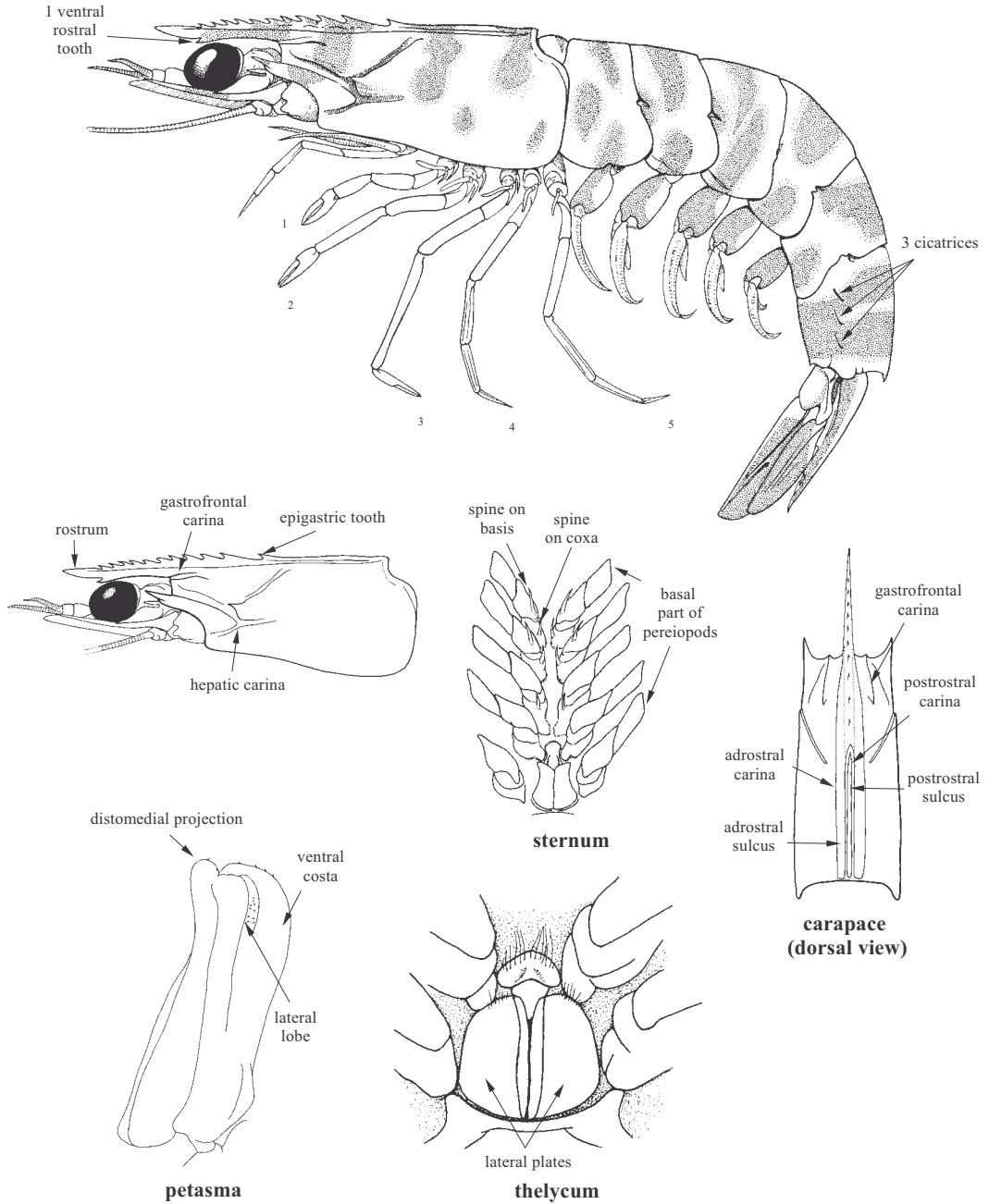
**Distribution**: Widely distributed in the Indo-West Pacific from East Africa to Fiji. Introduced into the Mediterranean in 1924 through the Suez Canal, now occurring in the eastern Mediterranean, Greece, Italy and France. Recently recorded from the east Atlantic coast in the English Channel and off southwest Spain near Cadiz. Probably also occurring off northwest Africa.



***Melicertus kerathurus* (Forsskål, 1775)**

**Frequent synonyms / misidentifications:** *Penaeus (Melicertus) kerathurus* (Forsskål, 1775); *P. trisulcatus* (Leach, 1814); *P. caramote* (Risso, 1816) / None.

**FAO names:** **En** – Caramote prawn; **Fr** – Caremote; **Sp** – Camarón langostino español.



**Diagnostic characters:** Integument smooth. Rostrum slightly curved upward at tip, with usually 11 teeth (from 8 to 13) on dorsal margin, **and a single strong tooth on ventral margin**. Carapace with well marked orbital angle; antennal and hepatic spines strong, lacking branchiostegal and pterygostomial spine; postocular sulcus absent; postrostral carina and adrostral carina and sulcus long, extending considerably beyond epigastric tooth, nearly to posterior margin of carapace; **gastrofrontal carina turning anterodorsally upon itself at posterior end**, and with short ramus projecting anteriorly from base, ventrally close to carina; gastrofrontal sulcus not distinctly bifid posteriorly; gastro-orbital carina long, at least three-quarters of distance between hepatic spine and orbital margin; orbito-antennal sulcus well marked; cervical carina sharp, accompanying sulcus deep; hepatic carina and sulcus well marked; branchiocardiac carina lacking; longitudinal and transverse sutures absent. **Sixth abdominal segment without dorsolateral grooves on either side of dorsal keel, with 3 cicatrices**. Telson armed with 3 pairs of lateral movable spines. Antennula lacking parapenaeid spine. Exopods on all maxillipeds and pereopods. First 2 pairs of pereopods with a conspicuous spine on the coxa and basis; third pair of pereopods with a spine on basis only. Petasma symmetrical, semiclosed, with distomedian projections short; ventral costae long, curved, lateral surface without tubercles. **Thelycum closed, with paired lateral plates on sternite XIV**. **Colour:** rather variable and differing with sex; males often light with transverse pink bars on abdomen; females greenish yellow or greyish yellow with copper-green or brownish mauve bars; tail fan often blue toward tip and edged with red.

**Size:** Maximum total length: 23.5 cm (females), 18.0 cm (males).

**Habitat, biology, and fisheries:** Occurring at depths between 5 and 50 m. Found in coastal waters close to river mouths throughout its range. During the reproduction period it prefers muddy bottoms but otherwise occurs more often on sandy bottoms rich in organic detritus or on seagrass beds. Spawning takes place in summer, but may extend from the beginning of May to mid-November; the growth areas of the postlarvae are found near river mouths and in lagoon areas. Feeds at night on small benthic organisms (molluscs, polychaetes, crustaceans and echinoderms). Available statistics show a wide variation in catches over the last 3 decades. Caught with bottom trawls. Marketed fresh or frozen.

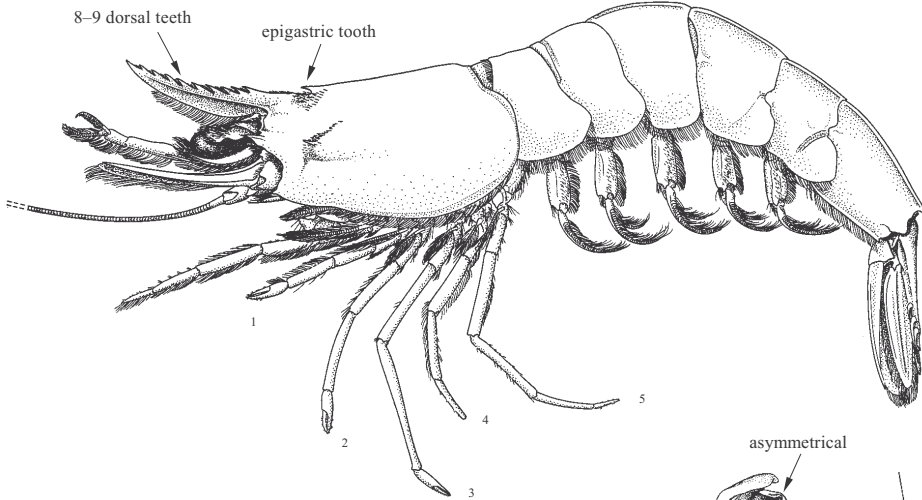
**Distribution:** Eastern Atlantic: from the south coast of England to Angola, including the entire Mediterranean but absent in the Black Sea.



***Metapenaeopsis miersi* (Holthuis, 1952)**

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

**FAO names:** En – Miers shrimp; Fr – Crevette miers; Sp – Camarón miers.



**Diagnostic characters:** Shrimp of moderate body size. Integument thick, pubescent. **Rostrum short, not extending beyond antennular peduncle, dorsally armed with 8 to 10 teeth; with convex ventral margin without teeth. Epigastric tooth separated from first rostral tooth. Carapace without longitudinal suture; with small orbital, and well developed antennal, pterygostomian, and hepatic spines, lacking branchiostegal spine; postocular sulcus absent; orbito-antennal and cervical sulci not developed.**

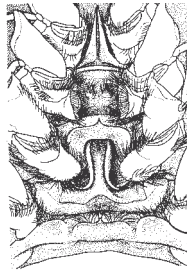
No pleurobranch on last thoracic somite. Sixth abdominal segment without cicatrices. **Telson with 3 pairs of conspicuous movable spines anterior to subapical fixed spines.** First segment of antennular peduncle bearing ventromesial (parapenaeid) spine; antennular flagella very short, especially in males. **Third maxilliped and first and second pereiopod with basal spine. Petasma asymmetrical.** Thelycum closed, with transverse plate on sternite XIV and strongly developed median protuberance on sternite XIII. **Colour:** not known.

**Size:** Maximum total length: 8.5 cm (females), and 7.0 cm (males).

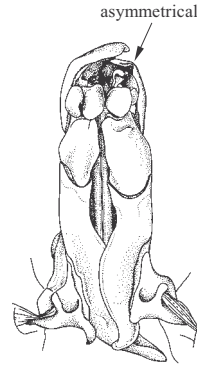
**Habitat, biology, and fisheries:** Inhabits muddy and sandy bottoms to depths of 50 m at temperatures of 15 to 28°C. Often trawled together with other penaeids.

**Distribution:** Eastern Atlantic: from Mauritania to Angola.

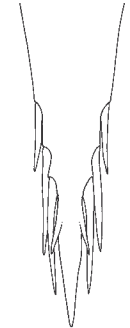
**Remarks:** One other species of *Metapenaeopsis*, *M. gerardoi* Pérez Farfante, 1971, has been recorded from St Helena in area 47. This species is distributed in the West Indies and along the Caribbean coast of Central and South America.



thelycum



petasma



tip of telson

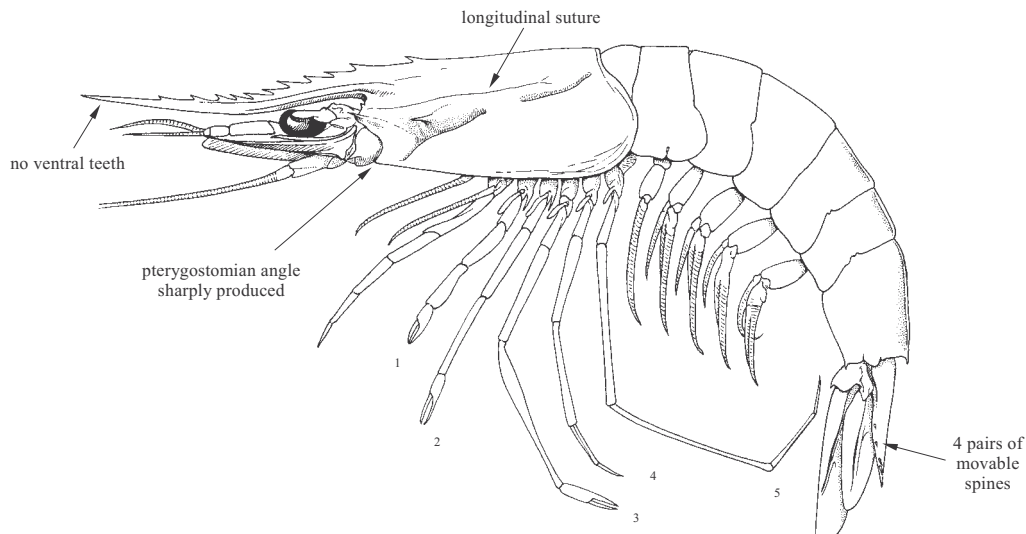




***Parapenaeopsis atlantica* Balss, 1914**

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

**FAO names:** En – Guinea shrimp; Fr – Crevette guinéenne; Sp – Camarón guineo.



**Diagnostic characters:** Integument thin, minutely setose-punctate. Rostrum rather long, its dorsal margin armed with usually 10 teeth, its tip slightly bent upward and extending well beyond distal end of antennular peduncles; **no ventral teeth**. Carapace with small orbital spine; well-developed antennal and hepatic spines; branchiostegal and pterygostomian spines lacking, pterygostomian angle sharply produced; post-ocular sulcus well defined; gastro-orbital carina absent; orbito-antennal and cervical sulci weak; hepatic sulcus clearly marked anteriorly; **longitudinal suture falling short of posterior margin of carapace**. Sixth abdominal segment with 2 short cicatrices. **Telson armed with 4 pairs of lateral movable spines**. Fourth pair of pereopods clearly shorter than the fifth (or last) pair. Antennula lacking parapenaeid spine. Epipod absent on third maxilliped, present on first and second pereopods, exopods present on all maxillipeds and pereopods; basal spine present on first and second pereopods. Petasma symmetrical, semiclosed, median lobes only barely perceptible. Thelycum closed, with plate of sternite XIV broad. **Colour:** an inconspicuous pale brownish pink; eyestalks lemon yellow; antennae and pereopods (except the first pair) brownish red; uropods of tail fan brownish red distally and edged with yellow toward their tips.

**Size:** Maximum total length: 17 cm (females), 12 cm (males).

**Habitat, biology, and fisheries:** Inhabits sand and muddy sand bottoms at depths between 10 and 40 m (sometimes at 60 m). Although it prefers warm waters this species is capable of living, during the cold season, in cool waters not exceeding 16°C. Growth takes place entirely in the sea. This species is apparently rather inactive in daytime, except in turbid waters. Fishing grounds are in coastal areas off Côte d'Ivoire, Liberia, Cameroon, Gabon, Ghana and Congo. A fluctuating resource, sometimes rare and sometimes very abundant, mainly near estuaries. Caught with bottom trawls. Marketed fresh and frozen.

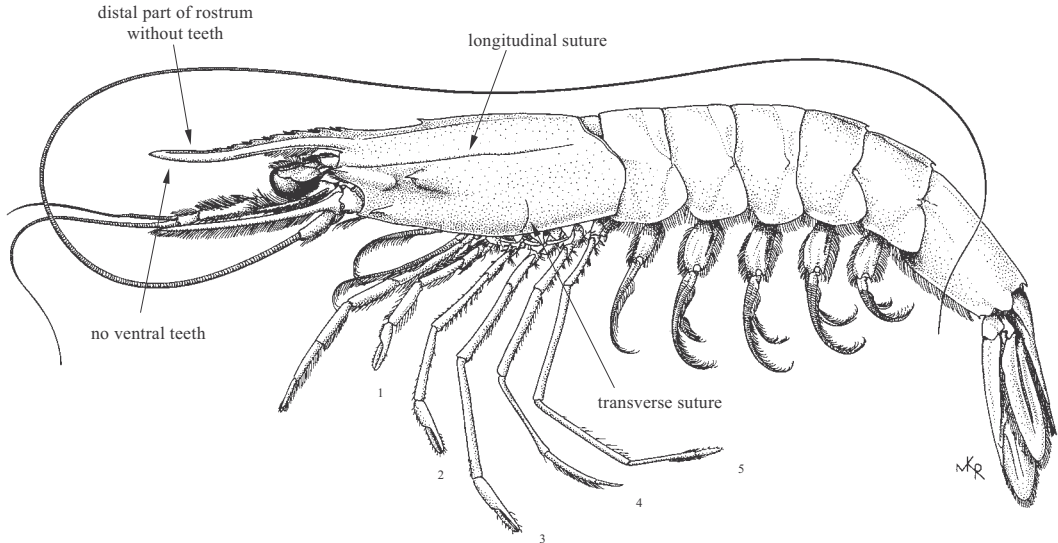
**Distribution:** Eastern Atlantic: West African coast from Senegal to Angola. Also reported trawled from muddy-sand bottom in 50 m of water on the Sofala Bank just north of Beira, Mozambique.



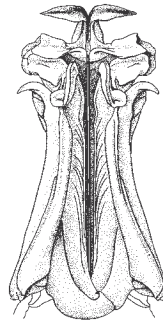
*Parapenaeus longirostris* (Lucas, 1846)

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

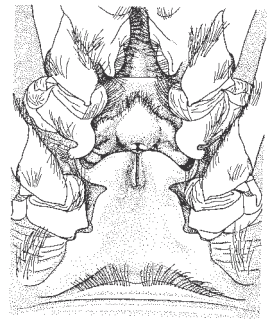
**FAO names:** En – Deep-water rose shrimp; Fr – Crevette rose du large; Sp – Gamba de altura.



**Diagnostic characters:** Integument smooth. Rostrum always slightly bent upward, its dorsal margin armed with usually 8 teeth, **distal part devoid of teeth**, gastric tooth well separated from other teeth; **ventral teeth absent**. Carapace with pointed orbital spine; with well-developed antennal, hepatic and branchiostegal spines; pterygostomial spine absent, pterygostomial angle produced; **longitudinal suture almost running throughout the length of carapace**; **transverse suture at level of second pereopod**. Sixth abdominal somite without cicatrix. **Telson ending in a pointed tip flanked by 2 fixed spines, its lateral margins without mobile spines**. No exopods at bases of pereopods. Petasma symmetrical, semiclosed, with numerous processes and folds; distomedian projections folded outward, pointed; dorsolateral projections with 1 distally and ventrolateral lobule with 2 terminal projections; distal parts of 3 lobules firmly connected by convoluted membrane. Thelycum with single anterior plate of sternite XIV raised in 2 pairs of lateral prominences. **Colour:** orange-pink with a clearly red rostrum; gastric region reddish violet and ovaries greenish (turquoise green at maturity) shining through the carapace; sides of abdomen with bright orange blotches at middle of junction between segments.



petasma



thelycum

**Size:** Maximum total length 19 cm in females, and 16 cm in males, commonly between 12 and 16 cm in females, between 8 and 14 cm in males.

**Habitat, biology, and fisheries:** Inhabits sandy mud bottoms at depths between 20 and 700 m, usually between 70 and 100 m, at temperatures of 8° to 15°C. It carries out important daily or monthly vertical migrations interpreted as phototrophic responses. Bathymetric distribution also varies with size, large individuals occupying the deepest part of the species depth range. Spawning takes place mainly in winter, from November to April. Feeding activity is primarily diurnal and as a result of this most of the catches are

taken by day. Feeds on benthic organisms (clams, mysids and small crangonids). Commercially important in the Mediterranean and Gulf of Guinea. Fished by trawlers in the area between southern Portugal and Rio de Oro, and off Senegal; however, it is not of great importance there. Caught with bottom trawls. Marketed fresh, cooked and frozen, or cooked and peeled. The species tastes exceptionally sweet and well flavoured and is greatly prized by consumers in the countries where it is available.

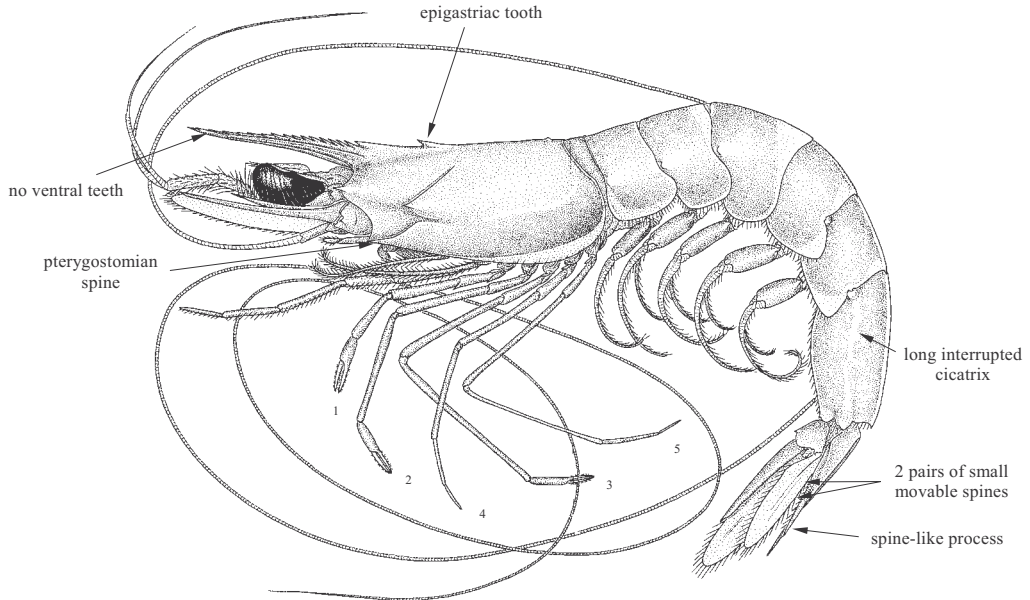
**Distribution:** East Atlantic: from Portugal to Angola, including the Mediterranean, absent in the Black Sea and the northern Adriatic. West Atlantic records of *Parapenaeus longirostris* refer to *P. politus* (Smith, 1881).



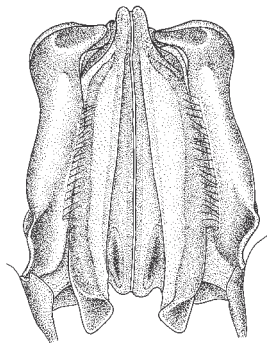
***Penaeopsis serrata* Bate, 1881**

**Frequent synonyms / misidentifications:** *Parapenaeus megalops* Smith, 1885, *Penaeopsis megalops* Burkenroad, 1934 / None.

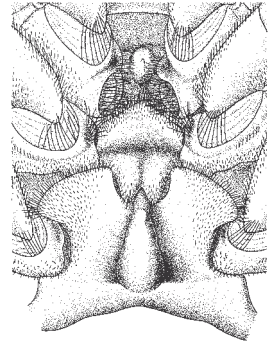
**FAO names:** En – Megalops shrimp; Fr – Crevette mégalops; Sp – Camarón megalops.



**Diagnostic characters:** Integument smooth in appearance, various areas microscopically setose. Rostrum variable in shape, sometimes horizontal but most often evenly curved downward (this feature predominating in specimens from the African coast), its dorsal margin armed with usually 14 (from 11 to 18) teeth, 2 of which are postrostral in position; **epigastric tooth conspicuously separated from first rostral tooth; no ventral teeth.** Eyes very large. **Carapace with well-developed antennal, hepatic and pterygostomian spines, without orbital and branchiostegal spines;** postocular sulcus lacking; cervical sulcus and carina well marked; hepatic sulcus with anterior part accompanied by sharp carina and descending from hepatic spine then turning toward and reaching pterygostomian spine, carina absent from posterior part; longitudinal and transverse sutures absent. Abdomen with a very prominent crest on the last 3 segments, ending posteriorly in 2 small, sharp teeth on segments 4 and 5, and in a simple point on segment 6; **sixth abdominal segment bearing long, interrupted cicatrix. Telson deeply concave mid-dorsally, its lancet-like tip flanked by a pair of spine-like processes preceded by 2 pairs of movable spines.** Petasma symmetrical, semiclosed. Thelycum closed, with single plate of sternite XIV occupying entire sternite. **Colour:** uniform pink, eyes black.



petasma



thelycum

**Size:** Maximum total length: 11 cm.

**Habitat, biology, and fisheries:** Inhabits sandy mud bottoms near the edge of the continental slope at depths between 100 and 600 m; most frequently captured between 250 and 400 m. Its biology is unknown. Apparently never taken in large quantities; mainly taken as bycatch in the fishery for *Parapenaeus longirostris*, a species with which it is frequently mixed. Caught with bottom trawls. Marketed fresh or frozen.

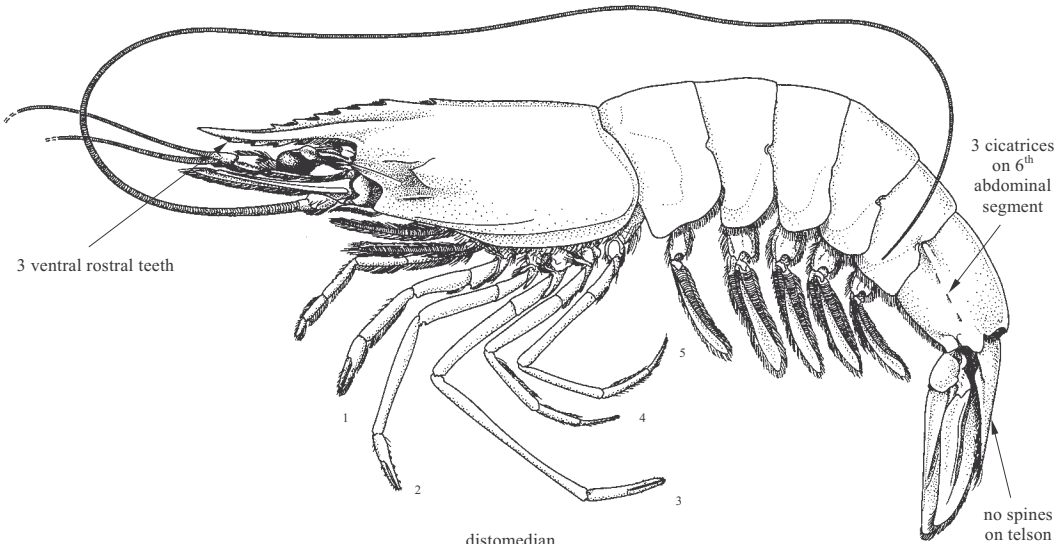
**Distribution:** Eastern Atlantic: off north African coast of Morocco and Rio de Oro; in the Mediterranean it has been recorded from the Balearic Islands and off southern Sardinia. Western Atlantic: from Massachusetts (USA) to Rio Grande do Sul, south Brazil, including the Bahamas, the Gulf of Mexico and the Caribbean Sea.



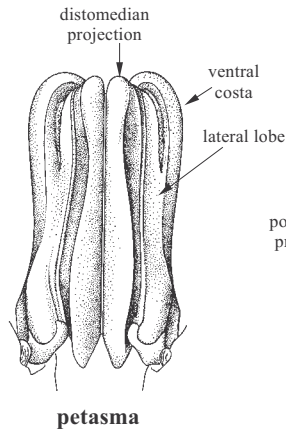
***Penaeus monodon* Fabricius, 1798**

**Frequent synonyms / misidentifications:** *Penaeus bubulus* Kubo, 1949; *P. carinatus* Dana, 1852; *P. semisulcatus exsulcatus* Hilgendorf, 1879 / None.

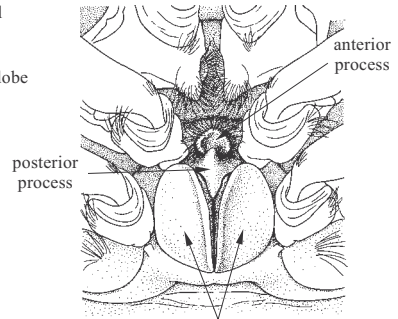
**FAO Names:** En – Giant tiger prawn; Fr – Crevette géante tigrée; Sp – Langostino jumbo.



**Diagnostic characters:** Integument smooth. Rostrum generally armed with 6 to 8 dorsal teeth (including those on carapace) and **3 lower teeth**. Carapace with antennal and hepatic spines pronounced, **lacking orbital, branchiostegal and pterygostomial spines; postocular sulcus absent**; cervical sulcus shallow; postrostral carina long, reaching almost to posterior margin of carapace; **adrostral carina and sulcus short, extending only to about level of epigstric tooth; gastrofrontal carina absent**; gastro-orbital carina short, orbito-antennal sulcus well marked,



petasma



thelycum

extending anteriorly not more than two-thirds of distance from hepatic spine to orbital margin; cervical and hepatic carinae well defined, cervical sulcus shallow; longitudinal and transverse sutures absent. **Sixth abdominal somite bearing 3 cicatrices**, lacking dorsolateral sulcus. **Telson unarmed**. Antennula lacking parapenaetid spine. Basial spine on first and second pereopods. Exopod on fifth pereopod absent. Petasma of males with distomedian projections slightly overhanging distal margin of costae. Thelycum of females formed by 2 suboval lateral plates with tumid lips; anterior process concave and rounded distally; posterior process subtriangular and partly inserted between lateral plates. **Colour:** body greyish greenish or dark greenish blue; becoming reddish brown in large adults; carapace with mud-yellow transverse bands, while abdomen bears dark brown and mud-yellow cross bands; eyes light brown with many black dots; antennal flagella uniformly greenish brown; legs same colour as body but sometimes reddish or with bright yellow and blue bands; pleopods somewhat reddish or pale red, with bases bright yellow and blue; distal half of uropods dark blue or dark brown with red or mud-yellow median transverse band, and margins reddish.

**Size:** Probably the largest known penaeid, with a maximum body length of 35 cm (females) and 26.8 cm (males), commonly between 12 and 20 cm.

**Habitat, biology, and fisheries:** Occurring from the coastline to depths of about 160 m, usually less than 30 m, on bottoms of sand, mud or silt. Juveniles usually inhabit seagrass beds, mangrove swamps and estuaries. Taken by trawls, gillnets, seine, stake nets, traps and artisanal gear in the Indo-West Pacific where it is of major economic importance. Also commercially important in aquaculture. Large-scale pond culture is practised in many Southeast Asian countries. Aquaculture projects have been initiated also in the Mediterranean. Now trawled along the West African coast.

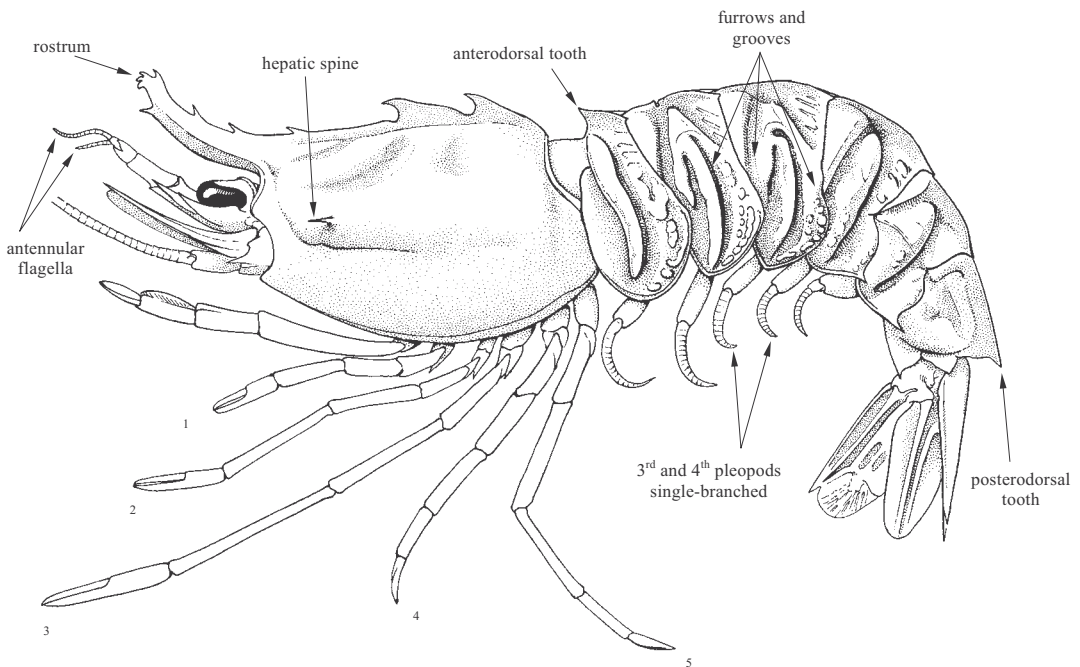
**Distribution:** Recently introduced in West Africa (Senegal, Nigeria, Benin, Cameroon). Widely distributed in the Indo-West Pacific from eastern coast of Africa to the Red Sea, Japan, Australia and Fiji.



## SICYONIIDAE

### Rock shrimps

**Diagnostic characters:** Small to medium sized shrimps. **Body robust, rigid, of stony appearance, Dintegument calcified.** Rostrum well developed (reaching to or exceeding distal end of eyestalks) and armed with more than 3 teeth; bases of eyestalks with styliform projections on their inner surface and without a tubercle on their mesial borders. Both upper and lower antennular flagella of similar length. **Carapace without postorbital and antennal spines, with hepatic spine only; cervical grooves very faint or absent. Exopod present only on first maxilliped.** Last 2 pairs of pereopods well developed. **Abdomen with distinct furrows and grooves.** First abdominal segment usually with strong anterodorsal tooth; sixth abdominal segment with a strong posterodorsal tooth. **Endopods of second pair of pleopods in males bearing only an appendix masculina; third and fourth pairs of pleopods single-branched.** Telson usually armed with a fixed spine on either side of tip. A single well-developed arthrobranch on fourth leg (hidden beneath carapace). **Colour:** from green to brown to grey. With distinct spots or colour markings on carapace and/or abdomen.



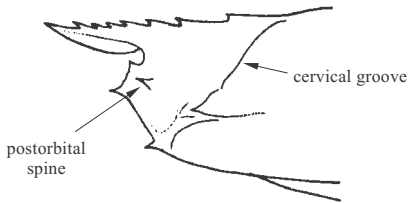
**Habitat, biology, and fisheries:** All of the representatives of this family are marine, benthic, predominantly tropical and subtropical, occurring on the continental shelf in depths between 3 and 70 m in the area. The sexes are easily distinguished by the presence of a large copulatory organ (petasma) on the first pair of pleopods of males, while females have the posterior thoracic sternites modified into a large sperm receptacle process (thelycum) which holds the spermatophores or sperm sacs after mating. The eggs are small and numerous, and are released directly into the water and not retained on the female abdomen. The larvae are planktonic and have the nauplius stage. The species are of minor commercial interest in the area.



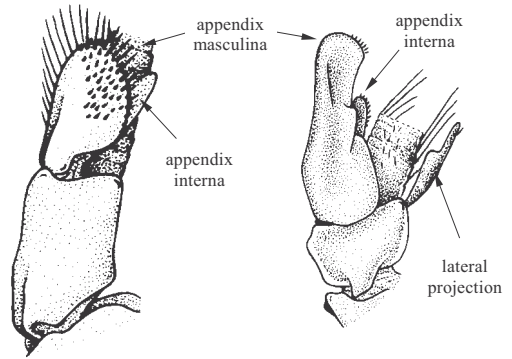
**Similar families occurring in the area**

Solenoceridae, Aristeidae, Benthescymidae and Penaeidae: integument thinner and less rigid; abdomen without deep grooves or tubercles. Further distinguishing characters of these families are the following:

Solenoceridae: carapace with postorbital spines; cervical grooves long; endopods of second pair of pleopods in males bearing appendix masculina, appendix interna and lateral projection; 2 well-developed arthrobranchs on either side of penultimate thoracic segment. Telson with fixed spines on either side of tip.



**Solenoceridae**



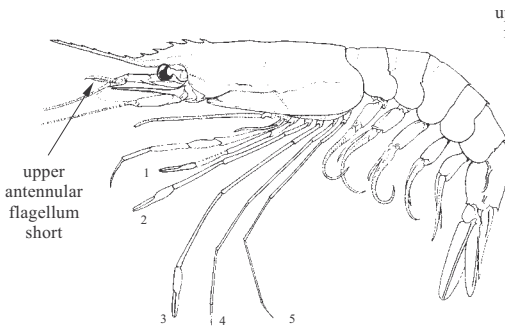
**Aristeidae**

**Solenoceridae**

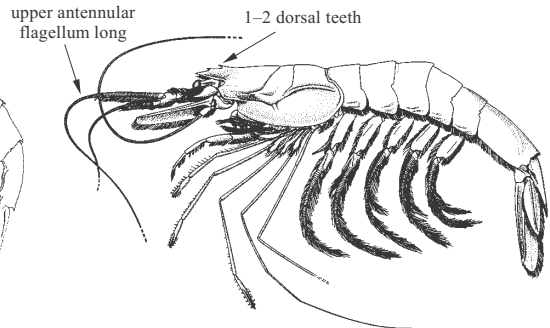
**endopods of 2<sup>nd</sup> pleopod in males**

Aristeidae: postorbital spines absent; upper antennular flagellum short; endopods of second pair of pleopods in males bearing appendix masculina and appendix interna but no lateral projection; spines on either side of tip of telson movable.

Benthescymidae: postorbital spines absent on carapace; upper antennular flagellum long; third to fifth pleopods with 2 branches; only 1 or 2 (occasionally 3) rostral/postrostral teeth.

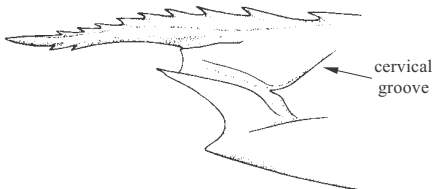


**Aristeidae**



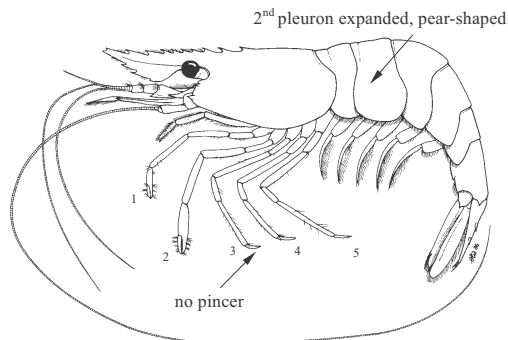
**Benthescymidae**

Penaeidae: postorbital spines absent; cervical grooves short; endopods of second pair of pleopods (in males) with an appendix masculina only; a single well-developed arthrobranch at bases of penultimate thoracic segment (hidden beneath carapace).



**Penaeidae**

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



**Caridea**

### Key to the species of Sicyoniidae occurring in the area

- 1a. Rostrum straight, only slightly curved upwards; 3 teeth on postrostral carina subequal (Fig. 1); hind margin of pleura of fourth abdominal segment rounded . . . . . ***Sicyonia carinata***
- 1b. Rostrum strongly curved upward; posteriormost 2 or 3 teeth on postrostral carina distinctly larger than anteriormost tooth (Fig. 2); hind margin of fourth abdominal segment with distinct posteroventral tooth . . . . . ***Sicyonia galeata***

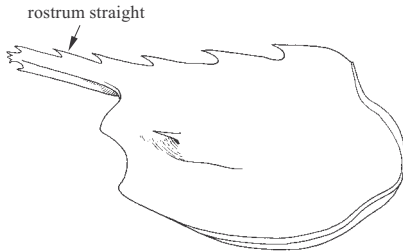


Fig. 1 *Sicyonia carinata*

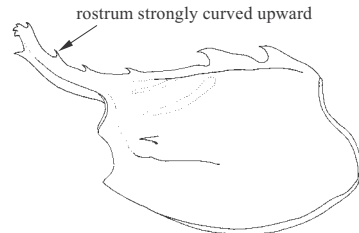



Fig. 2 *Sicyonia galeata*

### List of species occurring in the area

The symbol  is given when species accounts are included.

 *Sicyonia carinata* (Brünnich, 1768).

 *Sicyonia galeata* Holthuis, 1952.

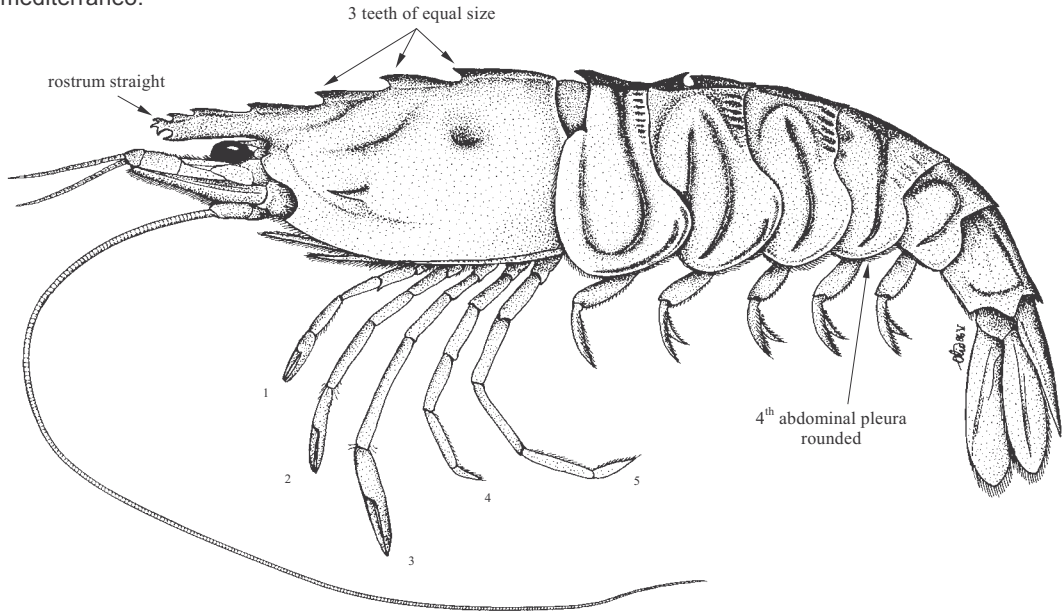
### References

- Lagardère, J.P.** 1981. Crevettes. In W. Fischer, G. Bianchi and W.B. Scott (eds), Fiches FAO d'identification des espèces pour les besoins de la pêche. Atlantique centre-est; zones de pêche 34, 47 (en partie). Canada Fonds de Dépôt. Ottawa, Ministère des Pêcheries et Océans Canada, en accord avec l'Organisation des Nations Unies pour l'Alimentation et l'Agriculture. Vol. VI: pag. var.
- Pérez Farfante, I. & Kensley, B.F.** 1997. Penaeoid and Sergestoid shrimps and prawns of the world. Keys and diagnosis for the families and genera. *Mémoires du Muséum National d'Histoire Naturelle*, 175: 1–233.

***Sicyonia carinata*** (Brünnich, 1768)

**Frequent synonyms / misidentifications:** *Sicyonia sculpta* H. Milne Edwards, 1830 / None.

**FAO names:** **En** – Mediterranean rock shrimp; **Fr** – Boucot méditerranéen; **Sp** – Camarón de piedra mediterráneo.



**Diagnostic characters:** Integuments strongly calcified and rigid. Rostrum long, rather slender and straight, its dorsal margin with 6 or 7 teeth; **mid-dorsal keel of carapace (postrostral crest) bearing 3 teeth of equal size**; ventral margin with 1 subdistal tooth. Carapace with hepatic spine, without antennal, branchiostegal and pterygostomial spine. First 3 pereopods with chelae. Abdomen rigid, strongly calcified, with dorsal median carina and lateral grooves; first abdominal segment with an anteriorly directed dorsomedian tooth; **hind margin of pleura of first 4 abdominal segments rounded**. **Colour:** dark olive green to green-brown, sometimes with red or yellow, with some marbled brown. Sometimes a dark brown spot surrounded by a yellow circle is sometimes present on the dorsomedian carina of the third abdominal segment; similar, but smaller, spots may be present on the first 2 abdominal segments.

**Size:** Maximum total length 8.2 cm, commonly between 3 and 6 cm.

**Habitat, biology, and fisheries:** Occurring in depths between 3 and 35 m, usually less than 5 m. Living on bottoms of sand, or slightly muddy sand, often with eelgrass. Of minor commercial interest to fisheries in the Mediterranean. Species with very good gastronomic qualities, but hampered by the fact that the shell is very hard. Also used as bait. Caught with bottom trawls and dredges. Marketed fresh and as bait. Of minor potential interest in the area.

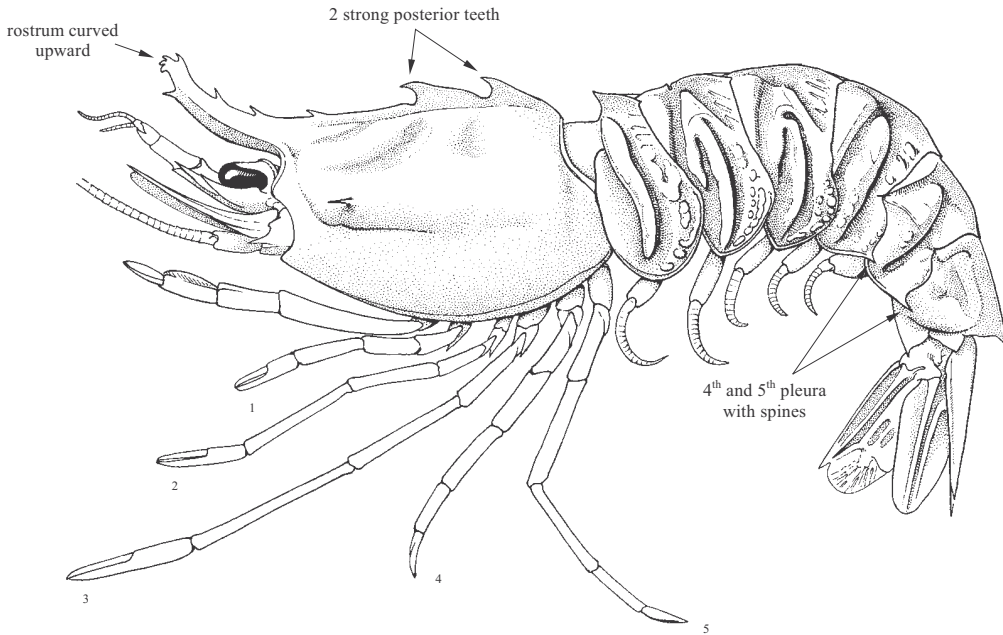
**Distribution:** Eastern Atlantic: from Portugal to Congo, West Africa, including the entire Mediterranean; absent in the Black Sea.



*Sicyonia galeata* Holthuis, 1952

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

**FAO names:** **En** – Tufted rock shrimp; **Fr** – Sicyonie huppée; **Sp** – Camarón penachudo.



**Diagnostic characters:** Integuments strongly calcified and rigid. Rostrum long, rather slender and distinctly curved upward, its dorsal margin with 3 teeth anterior to orbit; **mid-dorsal keel of carapace (postrostral crest) bearing 3 teeth, the last 2 very strong**. Carapace with hepatic spine, without antennal, branchiostegal and pterygostomial spine; pterygostomial angle produced. Abdomen rigid, strongly calcified, with dorsal median carina and lateral grooves; first abdominal segment with an anteriorly directed dorsomedian tooth; **hind margin of pleura of first 3 abdominal segments rounded, but those of segments 4 and 5 ending in a sharp, backward-pointing spine**. First 3 pereopods with chelae. **Colour:** greyish brown, antennae with red bands.

**Size:** Maximum total length 6.2 cm.

**Habitat, biology, and fisheries:** Inhabits mud or sandy mud bottoms between 15 and 70 m depth. Not exploited commercially at present. The species is too small and apparently not abundant enough to sustain a sizeable fishery and may at best serve as a supplementary resource in intertropical fisheries. May be caught with bottom trawls. Marketed fresh.

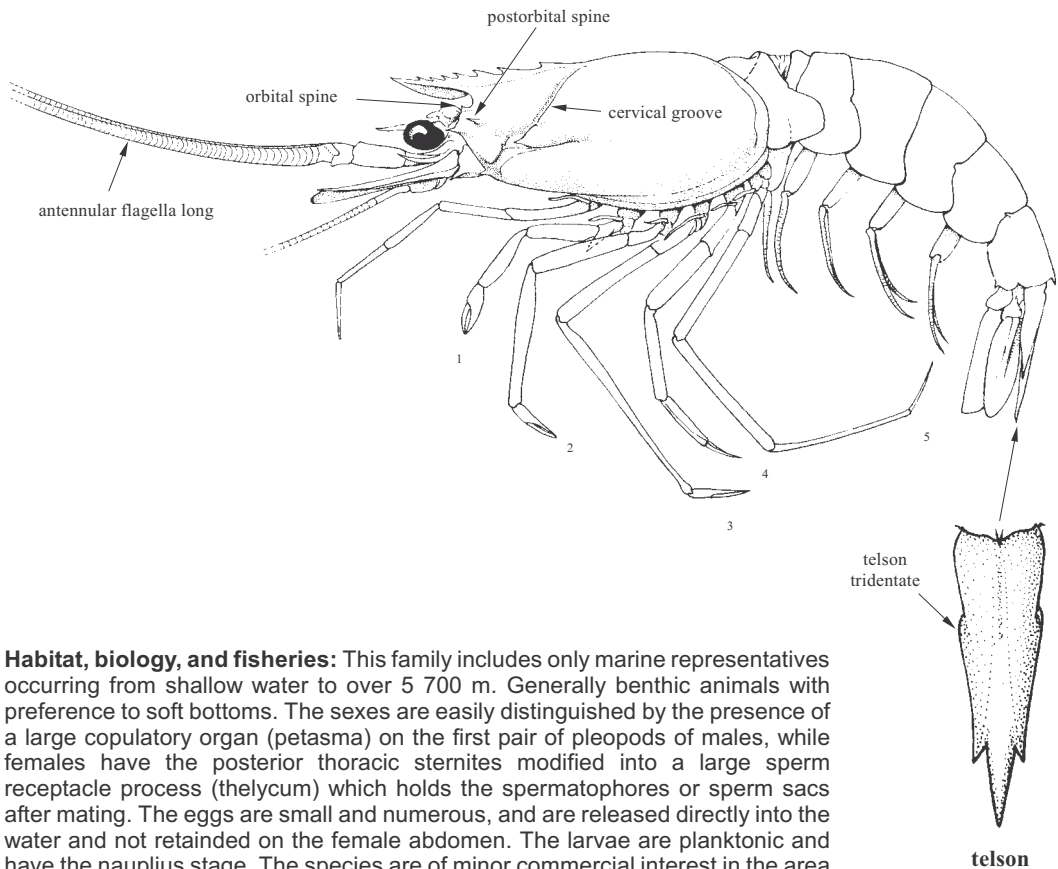
**Distribution:** Found from southwestern Sahara to Angola.



## SOLENOCERIDAE

### Solenocerid shrimps

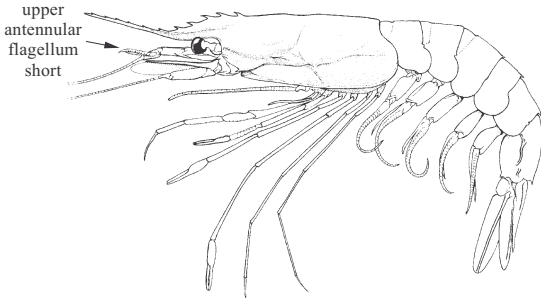
**Diagnostic characters:** Small to medium sized shrimps with a well-developed and toothed rostrum which extends to or beyond distal edge of eyes; no styliform projections at bases of eyestalks **but a tubercle present on their mesial (inner) border.** Carapace with **postorbital spines and long cervical grooves, which end at, or close to, dorsal midline.** Last 2 pairs of pereiopods well developed; **endopods of second pair of pleopods in males bearing appendix masculina, appendix interna and lateral projection;** third and fourth pairs of pleopods biramous. Telson tridentate (with a fixed spine on each side of tip). Two well-developed arthrobranchs on the penultimate thoracic segment (hidden beneath the carapace). **Colour:** generally pink to red.



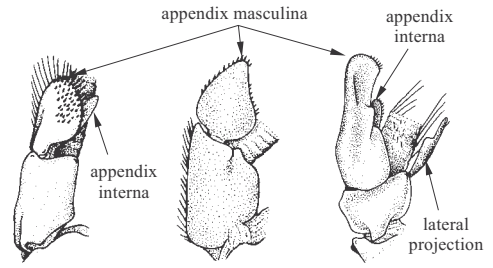
**Habitat, biology, and fisheries:** This family includes only marine representatives occurring from shallow water to over 5 700 m. Generally benthic animals with preference to soft bottoms. The sexes are easily distinguished by the presence of a large copulatory organ (petasma) on the first pair of pleopods of males, while females have the posterior thoracic sternites modified into a large sperm receptacle process (thelycum) which holds the spermatophores or sperm sacs after mating. The eggs are small and numerous, and are released directly into the water and not retained on the female abdomen. The larvae are planktonic and have the nauplius stage. The species are of minor commercial interest in the area but often caught in commercial catches and can easily be confused with the more commercial species.

**Similar families occurring in the area**

**Aristeidae:** postorbital spines on carapace absent; upper antennular flagellum short; telson bearing movable spines; endopods of second pair of pleopods in males bearing appendix masculina and appendix interna but no lateral projection.



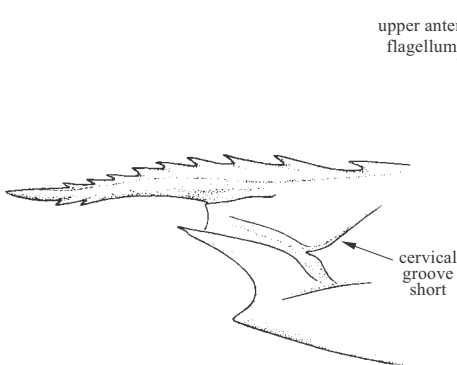
**Aristeidae**



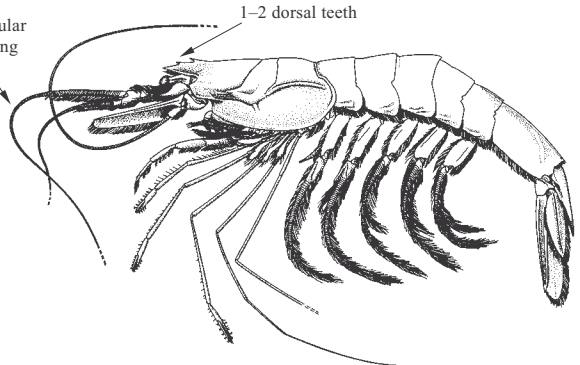
**endopod of 2<sup>nd</sup> pleopod in males**

**Penaeidae:** postorbital spines absent; eyestalks without tubercle on inner border; cervical grooves short; endopods of second pair of pleopods in males bearing appendix masculina only; a single, well-developed arthrobranch on penultimate thoracic segment (hidden beneath carapace).

**Benthescymidae:** postorbital spines absent on carapace; integument thin; upper antennular flagellum long; third to fifth pleopods biramous; only 1 or 2 (occasionally 3) rostral/postrostral teeth.

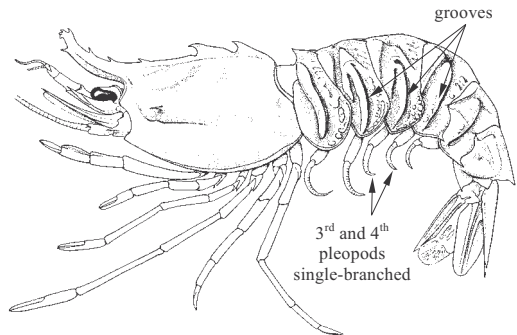


**Penaeidae**



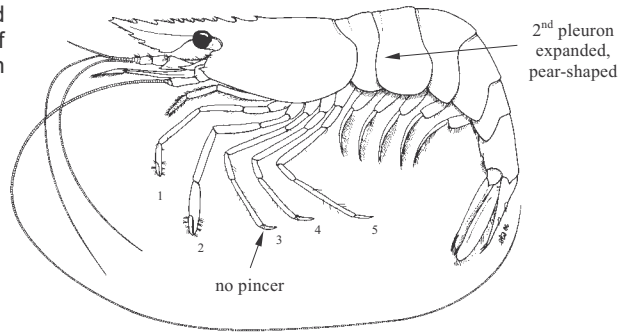
**Benthescymidae**

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



**Sicyoniidae**

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



Caridea

Key to the genera of Solenoceridae occurring in the area

- 1a. Orbital spine present (Fig. 1) . . . . . ***Solenocera***
- 1b. Orbital spine absent . . . . . → 2
  
- 2a. Fifth pereiopod flagelliform, considerably longer than fourth (Fig. 2) . . . . . ***Hadropenaeus***
- 2b. Fourth and fifth pereiopod flagelliform (Fig. 3) . . . . . ***Hymenopenaeus***

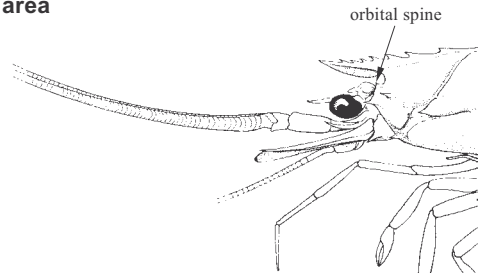


Fig. 1 *Solenocera*

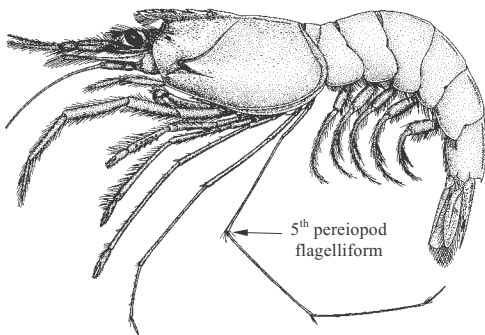


Fig. 2 *Hadropenaeus*

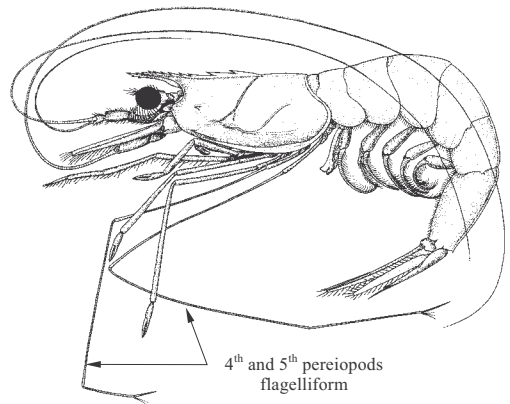


Fig. 3 *Hymenopenaeus*

### Key to the species of *Solenocera* occurring in the area

- 1a. Keel on third abdominal segment very faint (Fig. 4); median lobe of petasma (in males) comparatively broader, its tip less pointed (Fig. 5a) . . . . . ***Solenocera membranacea***
- 1b. A strong dorsal keel on last four abdominal segments, particularly evident on the third (Fig. 4); petasma (in males) with external lobe slender and elongate, ending in a point and only slightly enlarged toward the middle of its inner margin (Fig. 5b) . . ***Solenocera africana***

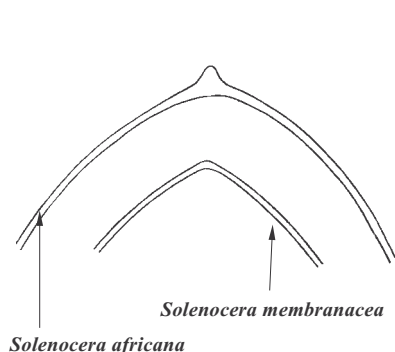
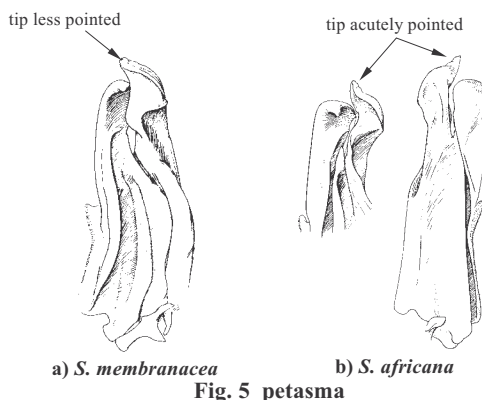



Fig. 4 cross-section of dorsal part of 3<sup>rd</sup> abdominal segment



a) *S. membranacea* Fig. 5 petasma  
b) *S. africana*

### List of species occurring in the area

The symbol  is given when species accounts are included

*Hadropenaeus affinis* (Bouvier, 1906).

*Hymenopenaeus aphoticus* Burkenroad, 1936.

*Hymenopenaeus chacei* Crosnier and Forest, 1969.

*Hymenopenaeus debilis* Smith, 1882.

*Hymenopenaeus laevis* (Bate, 1881).

 *Solenocera africana* Stebbing, 1917.

 *Solenocera membranacea* (Risso, 1816).

### References

Crosnier, A. & Forest, J. 1973. Les crevettes profondes de l'Atlantique Oriental Tropical. *Faune Tropicale*, ORSTOM, Paris, 19: 1–409, figs 1–121.

Holthuis, L.B. 1987. Crevettes. In W. Fischer, M. Schneider & M.-L. Bauchot, eds. *Fiches FAO d'identification des espèces pour les besoins de la Pêche. (Révision 1). Mediterranee et Mer Noire. Zone de Peche 37*. Rome, FAO. pp. 189–292.

Lagardère, J.P. 1981. Crevettes. In W. Fischer, G. Bianchi & W.B. Scott, eds. *Fiches FAO d'identification des espèces pour les besoins de la pêche. Atlantique centre-est; zones de pêche 34, 47 (en partie)*. Canada Fonds de Dépôt. Ottawa, Ministère des Pêcheries et Océans Canada, en accord avec l'Organisation des Nations Unies pour l'Alimentation et l'Agriculture. Vol. VI: pag. var.

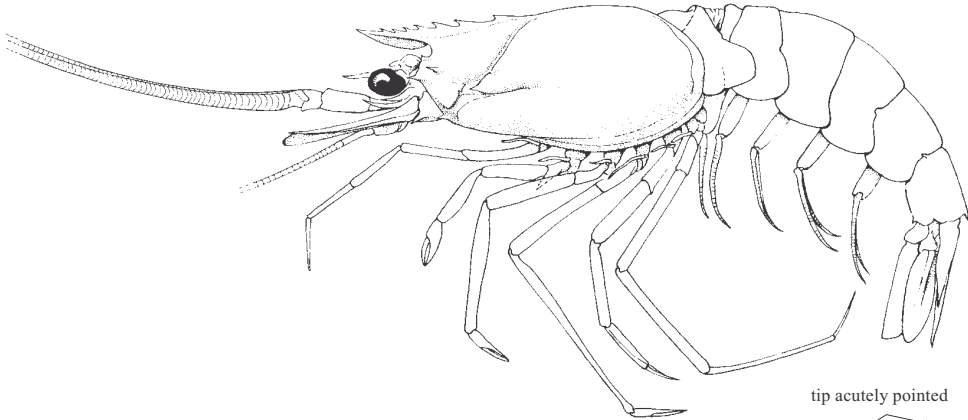
Pérez Farfante, I. & Kensley, B.F. 1997. Penaeoid and Sergestoid shrimps and prawns of the world. Keys and diagnosis for the families and genera. *Mémoires du Muséum National d'Histoire Naturelle*, 175: 1–233.



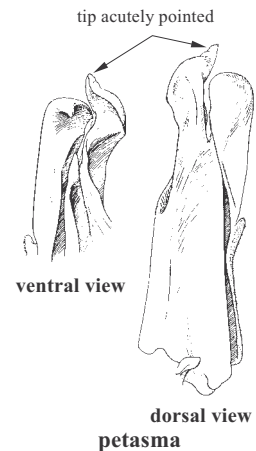
***Solenocera africana* Stebbing, 1917**

**Frequent synonyms / misidentifications:** None / *Solenocera membranacea* (Risso, 1816).

**FAO names:** En – African mud shrimp; Fr – Solenocère d'Afrique; Sp – Camarón fanguero africano.



**Diagnostic characters:** Rostrum short, slightly upcurved at apex, its dorsal margin with 5 to 7 teeth of which 3 or 4 located on carapace behind orbit, its ventral margin smooth. Sculpturing of carapace includes: median dorsal keel (postrostral crest) initiating on rostrum and becoming weaker in posterior third of carapace, deep cervical groove not crossing dorsal keel, hepatic spine, postorbital spine and additional small spine at junction of orbital and antennular margins. Antennular flagella with inner surfaces concave throughout their length, forming, when joined together, a complete tube. **Strong dorsal keel on the last four abdominal segments, particularly evident on the third. Petasma in males with external lobe slender and elongate, ending in point and only slightly enlarged toward middle of inner margin. Colour:** light pinkish orange.



**Size:** Maximum total length: 14 cm.

**Habitat, biology and fisheries:** Depth range varies with developmental stages: immature individuals are most abundant between 50 and 100 m, but may descend to nearly 300 m; only adults occur below this depth. This species inhabits sand and mud bottoms and is active at night. Feeds on benthic organisms (polychaetes, small crustaceans and molluscs). The fishing grounds are on the continental slope throughout its range. Caught with bottom trawls. Marketed fresh and frozen.

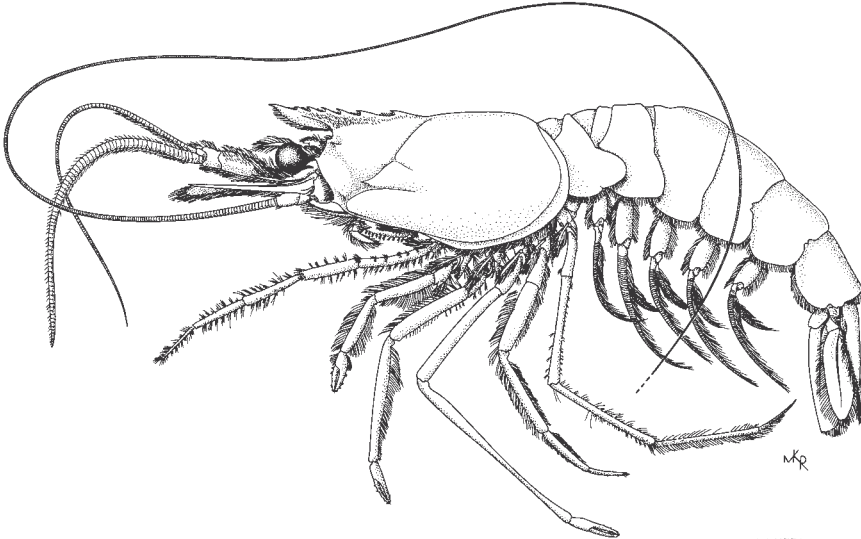
**Distribution:** Reported from Mauritania (about the Tropic of Cancer) southward to the Agulhas Bank (South Africa).



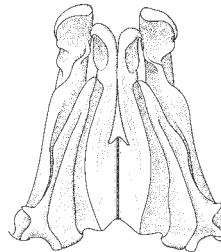
*Solenocera membranacea* (Risso, 1816)

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

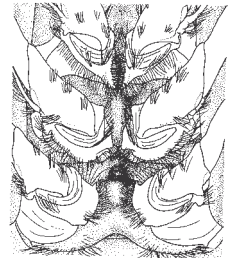
**FAO names:** **En** – Atlantic mud shrimp; **Fr** – Salicouque des vases de l'Atlantique; **Sp** – Gamba de fango del Atlántico.



**Diagnostic characters:** Rostrum short, straight, its dorsal margin with 7 teeth of which 2 or 3 located on carapace behind orbit, ventral margin smooth. Carapace with postorbital, antennal and pterygostomial spines, and additional small spine at junction of orbital and antennal margins; median dorsal keel (postrostral carina) initiating on rostrum and extending posterior, almost reaching posterior margin of carapace; deep cervical groove not crossing dorsal keel. Antennular flagella with inner surfaces concave throughout their length, forming, when joined together, a complete tube. **Dorsal keel on abdominal segments weak. Petasma in males with external lobe rather broad, ending in blunt point. Colour:** red orange, more or less transparent.



petasma



thelycum

**Size:** Maximum total length 12 cm, commonly between 8 and 10 cm.

**Habitat, biology, and fisheries:** Occurring between 20 and 700 m depth, most common between 50 and 450 m. Living on muddy bottoms. Mostly captured at night with trawls. Of importance to fisheries in the Mediterranean. On the West African coast, the species is taken together with the commercially important *Parapenaeus longirostris*, but *Solenocera membranacea* is not of commercial importance there.

**Distribution:** Eastern Atlantic: from Ireland to Mauritania, Azores, Senegal; entire Mediterranean, absent in the Black Sea. Southeast Atlantic off Cape of Good Hope, Agulhas Bank.



## Suborder PLEOCYEMATA

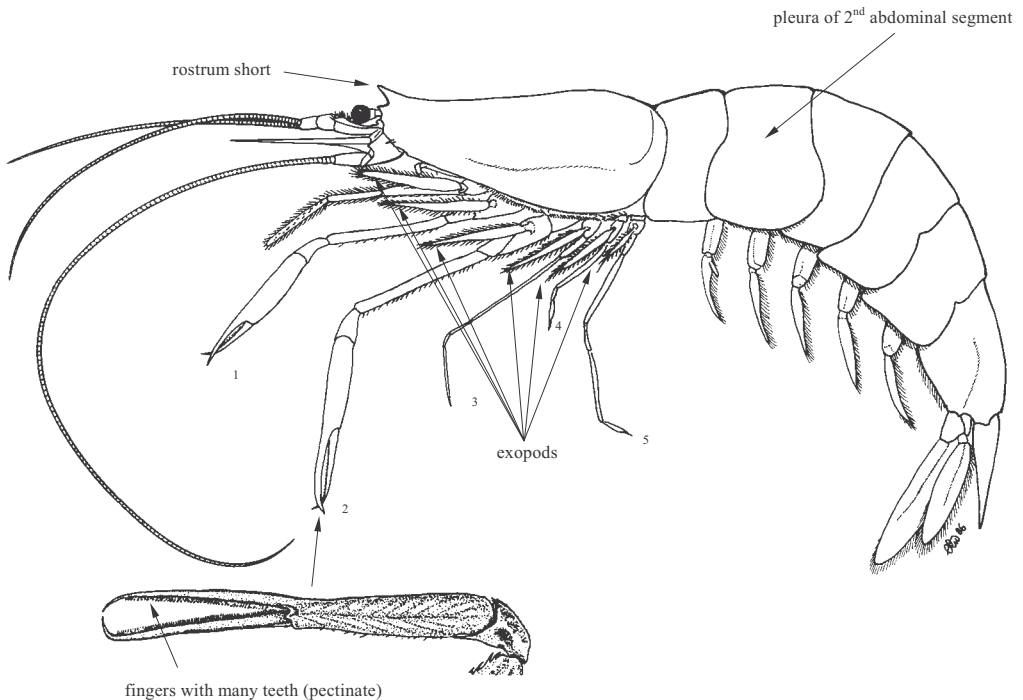
## Infraorder CARIDEA

## Superfamily PASIPHAEOIDEA

## PASIPHAEIDAE

## Glass shrimps

**Diagnostic characters:** As in other families belonging to the infraorder Caridea, the pleura of the second abdominal segment overlap those of first and third segments, and the third pair of pereiopods lacks pincers. **Body strongly compressed; rostrum short; carapace without cervical groove. First and second pair of pereiopods almost identical, second slightly larger than first, both larger and stronger than pairs 3 to 5; carpus of second pair of pereiopods entire; fingers of chela with many teeth (pectinate); exopods present, but epipods absent on all pereiopods. Colour:** usually red or transparent (hence the name glass shrimps).

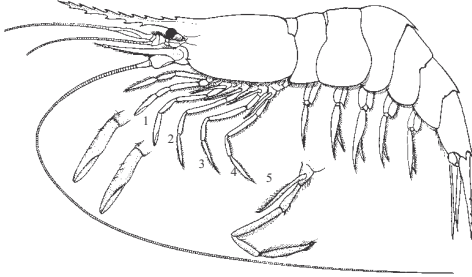


**Habitat, biology, and fisheries:** This family includes several medium- to large-sized species mostly from the deeper waters of the continental slope. Many of the West African species are benthic- or meso-pelagic.

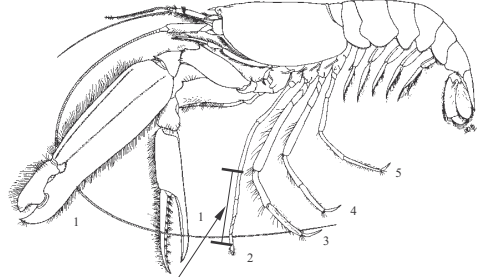
**Similar families occurring in the area**

Oplophoridae: cutting edges of the fingers of the first two pereopods without numerous teeth.

Alpheidae: eyes covered by carapace; first pereopods much stronger than second; second pereopods with segmented carpus.



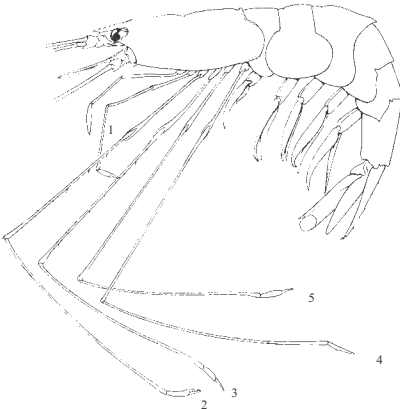
**Oplophoridae**



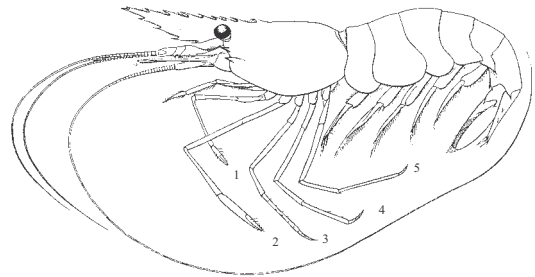
carpus P2 segmented **Alpheidae**

Nematocarcinidae: first 2 pairs of pereopods similar and slender; the following pairs extremely elongate.

Palaemonidae: first pair of pereopods with small pincers; second pair much better developed and bearing strong pincers.



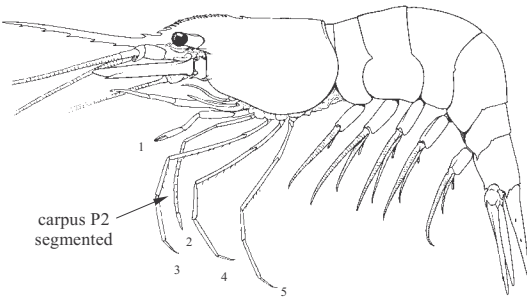
**Nematocarcinidae**



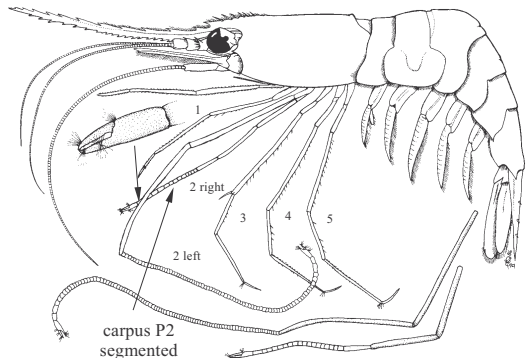
**Palaemonidae**

Hippolytidae: first pair of pereopods rather robust, ending in well-developed pincers; carpus in second pair segmented.

Pandalidae: pincers of first pair of pereopods very small or absent; carpus in second pair segmented.



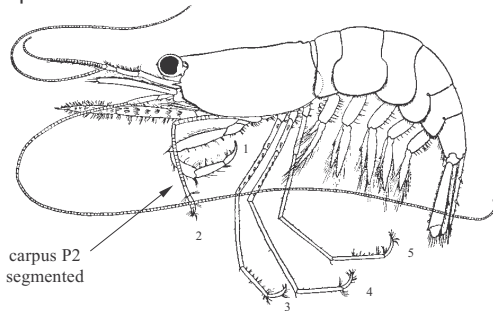
**Hippolytidae**



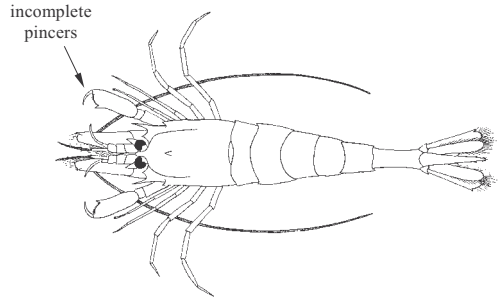
**Pandalidae**

Processidae: only 1 of the first pereiopods with a pincer, the other simple; carpus of second pereiopod segmented.

Crangonidae: first pair of pereiopods very robust with incomplete pincers lacking the fixed finger; body depressed.



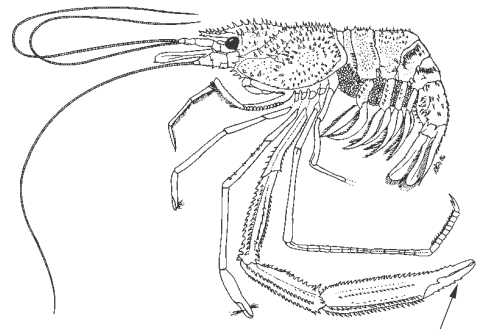
**Processidae**



**Crangonidae**

Stenopodidae: third pair of pereiopods with pincers.

Penaeidean shrimps: pleura of second abdominal segment not overlapping those of first segment; the 3 first pairs of pereiopods ending in pincers.



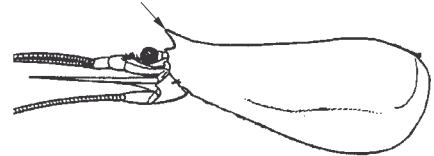
**Stenopodidae**

P3 with pincer

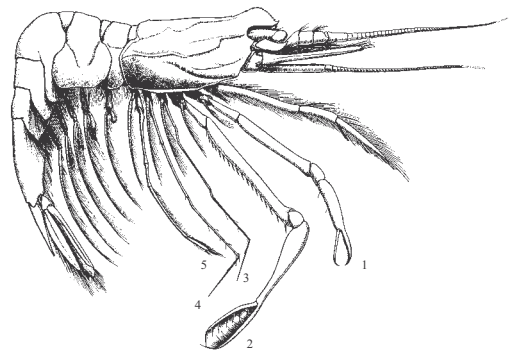
**Key to the genera of Pasiphaeidae occurring in the area**

- 1a. Mandible without a palp; rostrum formed by an erect postfrontal spine (Fig. 1) . . . . . ***Pasiphaea***
- 1b. Mandibular palp present; rostrum a normal forward-directed prolongation of the carapace. . . . . → 2
- 2a. Fourth pereiopod distinctly shorter than either third or fifth leg . . . . . → 3
- 2b. Fourth pereiopod longer than fifth leg, though sometimes shorter than third (Fig. 2) . . . . . ***Psathyrocaris***

rostrum as postfrontal spine



**Fig. 1 *Pasiphaea***



**Fig. 2 *Psathyrocaris***

- 3a. Antennal and branchiostegal spines absent; dorsal margin of carapace usually without teeth (Fig. 3) . . . . . **Parapasiphae**
- 3b. Antennal and branchiostegal spines present; dorsal margin of carapace with teeth . . . . . → 4
- 4a. Third maxilliped with 1 arthrobranch (Fig. 4) . . . . . **Glyphus**
- 4b. Third maxilliped with 2 arthrobranches (Fig. 5) . . . . . **Eupasiphae**

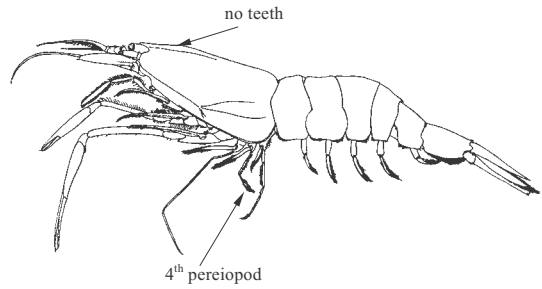


Fig. 3 *Parapasiphae*

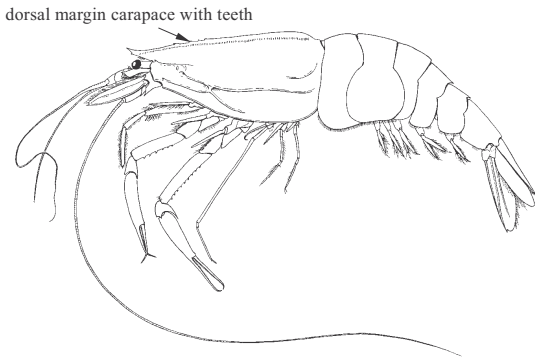


Fig. 4 *Glyphus*

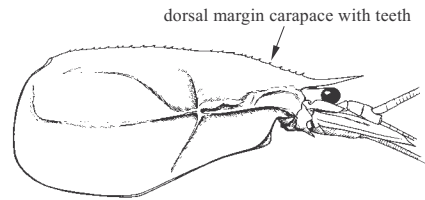


Fig. 5 *Eupasiphae*

**Key to the species of *Pasiphaea* occurring in the area**

- 1a. Abdominal segments with dorsal carina . . . . . → 2
- 1b. Abdominal segments without dorsal carina . . . . . → 5
- 2a. None of the abdominal segments with posterodorsal spine . . . . . → 3
- 2b. Fourth, fifth and sixth abdominal segments with posterodorsal spines (Fig. 6) . . . . . ***Pasiphaea hoplocerca***

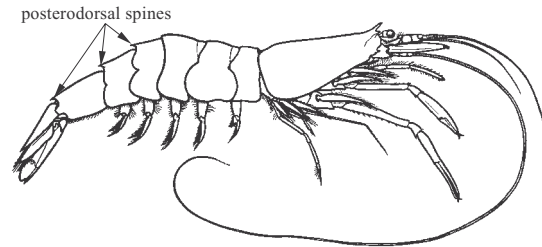


Fig. 6 *Pasiphaea hoplocerca*

- 3a. Rostrum spine-like, inferior margin concave (Fig. 7a); basis of second pereopod with 7 to 12 spines (Fig. 7b) . . . . . ***Pasiphaea multidentata***
- 3b. Rostrum plate-like (Fig. 8), inferior margin sinuous; basis of second pereopod with 0 to 7 spines . . . . . → 4

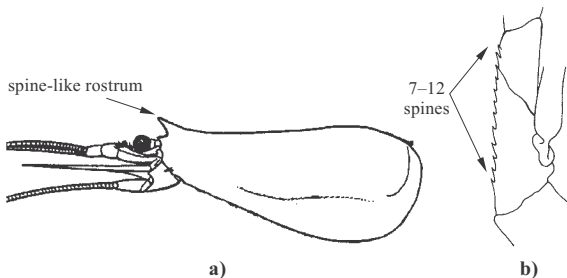


Fig. 7 *Pasiphaea multidentata*

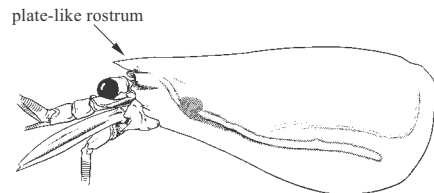
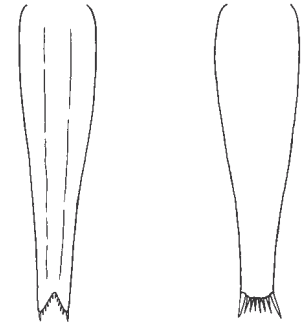


Fig. 8 *Pasiphaea tarda*

- 4a. Carapace dorsally carinate; merus of first pereiopods with 2 to 8 spines; merus of second pereiopod with 14 to 21 spines; basis of second pereiopod with 2 to 7 spines. . . . . ***Pasiphaea tarda***
- 4b. Carapace without dorsal carina; merus of first pereiopod without spines; merus of second pereiopod with 5 spines; basis of second pereiopod without spines . . . . . ***Pasiphaea princeps***

- 5a. Distal margin of telson strongly incised (Fig. 9a); none of the abdominal segments with posterodorsal spine . . . . . → 6
- 5b. Distal margin of telson convex (Fig. 9b); as least sixth abdominal segment with posterodorsal spine . . . . . → 7



a) incised                      b) convex  
Fig. 9 telson

- 6a. Rostrum directed upward (Fig. 10); chela of both first and second pereiopods slender; fingers of first pereiopod as long as palm . . . . . ***Pasiphaea ecarina***
- 6b. Rostrum directed forward (Fig. 11); chela of first pereiopod more robust than that of second pereiopod; fingers of first pereiopod much shorter than palm . . . . . ***Pasiphaea liocerca***

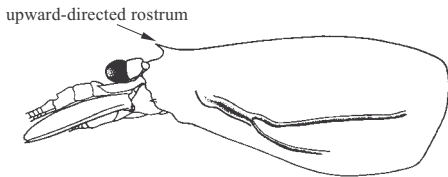


Fig. 10 *Pasiphaea ecarina*

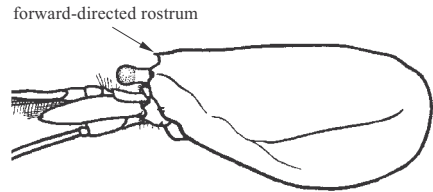


Fig. 11 *Pasiphaea liocerca*

- 7a. Only sixth abdominal segment with posterodorsal spine (Fig. 12); merus of second pereiopod denticulate . . . . . ***Pasiphaea sivado***
- 7b. Fourth and sixth abdominal segments with posterodorsal spine (Fig. 13); merus of second pereiopod unarmed . . . . . ***Pasiphaea semispinosa***

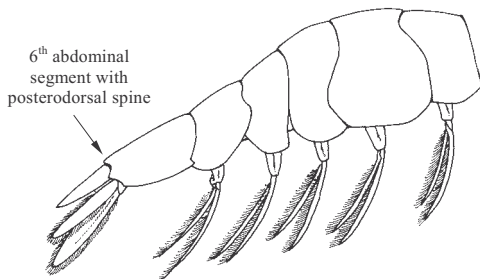


Fig. 12 *Pasiphaea sivado*

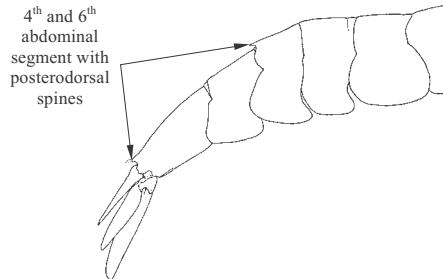



Fig. 13 *Pasiphaea semispinosa*

**List of species occurring in the area**

The symbol  is given when species accounts are included.

*Eupasiphae gilesii* (Wood Mason, 1892).

*Eupasiphae serrata* (Rathbun, 1902).

 *Glyphus marsupialis* Filhol, 1884.

*Parapasiphae sulcatifrons* Smith, 1884.

*Pasiphaea ecarina* Crosnier, 1969.


*Pasiphaea hoplocerca* Chace, 1940.

*Pasiphaea liocerca* Chace, 1940.

 *Pasiphaea multidentata* Esmark, 1866.

*Pasiphaea princeps* S.l. Smith, 1884.

*Pasiphaea semispinosa* Holthuis, 1951.

 *Pasiphaea sivado* (Risso, 1816).

*Pasiphaea tarda* Kroyer, 1845.

*Psathyrocaris fragilis* Wood-Mason in Wood-Mason and Alcock, 1893.

*Psathyrocaris infirma* (Wood-Mason MS) Alcock and Anderson, 1894.

**References**

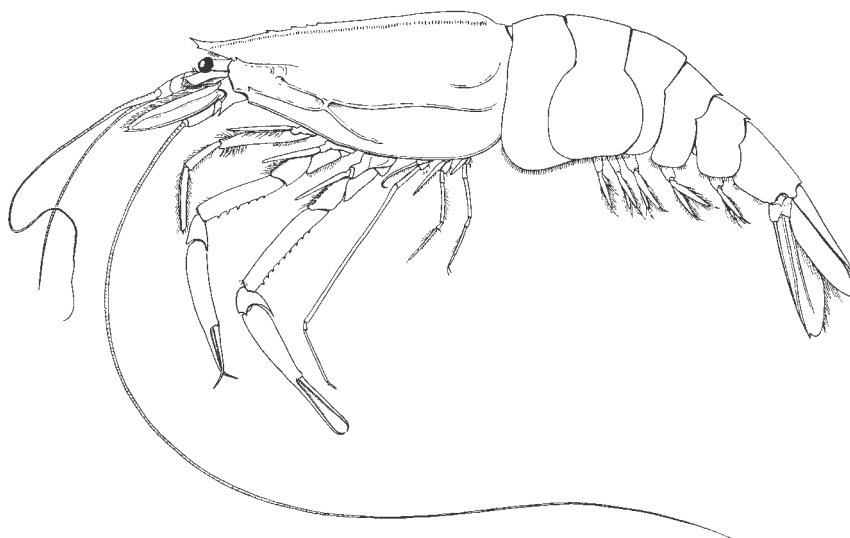
- Crosnier, A. & Forest, J.** 1973. Les crevettes profondes de l'Atlantique oriental tropical. *Faune tropicale*, ORSTOM, Paris, 19: 1–409, figs 1–121.



***Glyphus marsupialis*** Filhol, 1884

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

**FAO names:** **En** – Kangarou shrimp; **Fr** – Sivade kangourou; **Sp** – Camarón canguro.



**Diagnostic characters:** Body compressed. **Rostrum short**, slightly curved upward, smooth dorsally and with a single tooth on ventral margin, **prolonged posteriorly by a strong keel running to posterior margin of carapace and bearing 4 to 8 teeth** that tend to disappear with age; sides of carapace ornamented with 2 spines (antennal and branchiostegal) and **several round-edged crests forming a slightly oblique H-pattern**. Palp of mandible composed of 1 or 2 articles; first 2 pairs of pereiopods robust ending in pincers with curved fingers; merus in first pair of pereiopods bearing 6 to 8 spines, in second pair, 7 to 9 spines. **Abdominal segments 2 to 6 with a mid-dorsal keel**, which however is incomplete on segments 2 and 3. Integument thin. **Colour:** uniform brilliant red.

**Size:** Maximum total length: 16.7 cm.

**Habitat, biology, and fisheries:** Inhabits waters over muddy sand bottoms of the continental slope between 500 and 1 100 m depth. Eggs very large and rather few (some tens per female). Probably carnivorous, like other glass shrimps. Separate statistics are not reported for this species. Although it is never very abundant, the catch per unit effort is not negligible, and it can be expected to be a valuable complement as bycatch in the fishery for the large penaeid shrimps. Caught with bottom trawls. Reported in exploratory fisheries off French Guiana and Suriname. This species is easily distinguished from other glass shrimps liable to appear in trawl catches within the area by its stout body shape, the depth of its carapace and its beautiful uniform red colour.

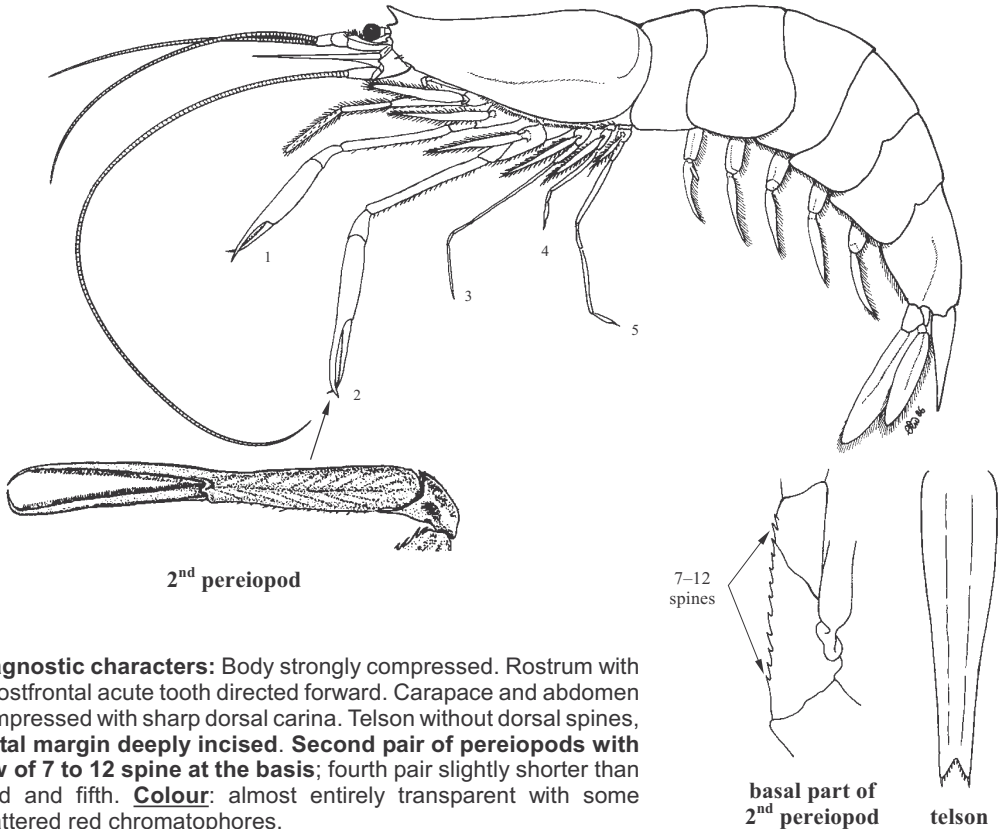
**Distribution:** Eastern Atlantic: Southwestern Sahara to Angola. Western Atlantic: off the northern coast of South America.



*Pasiphaea multidentata* Esmark, 1866

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

**FAO names:** **En** – Pink glass shrimp; **Fr** – Sivade rose; **Sp** – Camarón cristal rosado.



**Diagnostic characters:** Body strongly compressed. Rostrum with 1 postfrontal acute tooth directed forward. Carapace and abdomen compressed with sharp dorsal carina. Telson without dorsal spines, distal margin deeply incised. **Second pair of pereiopods with row of 7 to 12 spine at the basis; fourth pair slightly shorter than third and fifth.** **Colour:** almost entirely transparent with some scattered red chromatophores.

**Size:** Maximum total length 12.5 cm (female), maximum carapace length 1.91 cm (female).

**Habitat, biology, and fisheries:** Pelagic, occurring in depths of 10 to 2 000 m (most common between 400 and 700 m). Interest to fisheries is minor. Caught together with more economically important species in the Mediterranean and brought to Spanish, Italian, Greek and Algerian markets. Marketed fresh and frozen.

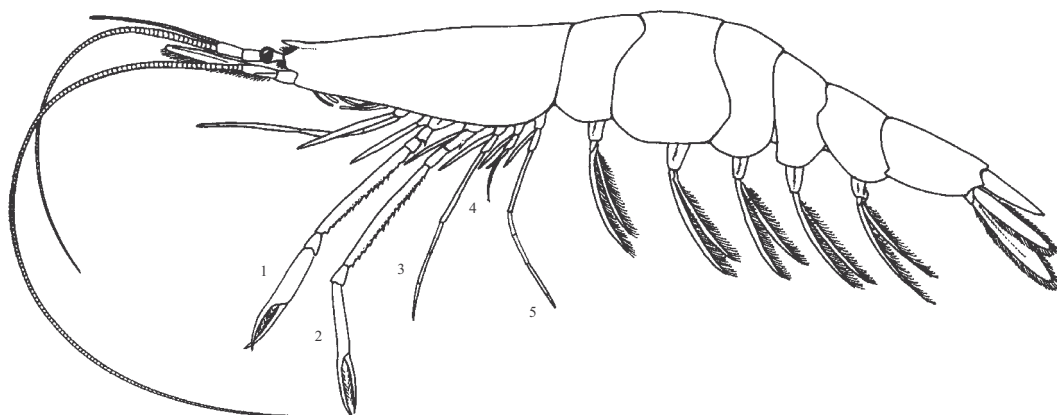
**Distribution:** North Atlantic: Northern Norway, south to Western Sahara and Mauritania, including most of the Mediterranean (excluding the northern part of the Adriatic Sea and the Black Sea); Iceland; southeast of Greenland to Massachusetts, USA, including Gulf of St Lawrence and Gulf of Maine.



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

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

**FAO names:** En – White glass shrimp; Fr – Sivade blanc; Sp – Camarón cristal blanco.



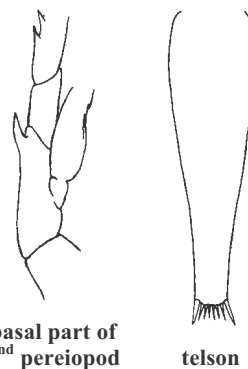
**Diagnostic characters:** Body strongly compressed. Rostrum with 1 postfrontal acute tooth directed forward. Abdominal segments without dorsal carinae. Telson without dorsal spines, **distal margin convex, not incised. Second pair of pereiopods with a single spine at the basis**; fourth pair much shorter than third and fifth. **Colour:** almost entirely transparent with some scattered chromatophores on the abdominal segments, antennae and pereiopods.

**Size:** Maximum total length 8 cm (female), maximum carapace length 2.15 cm (female); total length usually between 4 and 7 cm.

**Habitat, biology, and fisheries:** Occurring in depths between 0 and 700 m (most frequent between 100 and 300 m); pelagic. Females are ovigerous from December to April and in June and July (Spain). Of minor interest to fisheries. Caught together with more economically important species in the Mediterranean and brought to Spanish, Italian, Greek and Algerian markets. Marketed fresh and frozen.

**Distribution:** Eastern Atlantic: Norway, Ireland and Scotland south to Morocco and east to the eastern Mediterranean (excluding northern part of Adriatic Sea and Black Sea). Reported from off South Africa.

**Remarks:** Also reported from the Red Sea, but these records proved to be referable to *Pasiphaea marisrubri* Iwasaki, 1989. Re-examination of Indian Ocean *Pasiphaea* might reveal the delimitations of the present species. Records under this name from Japan proved to be *P. japonica* Omori, 1976.



basal part of  
2<sup>nd</sup> pereiopod

telson

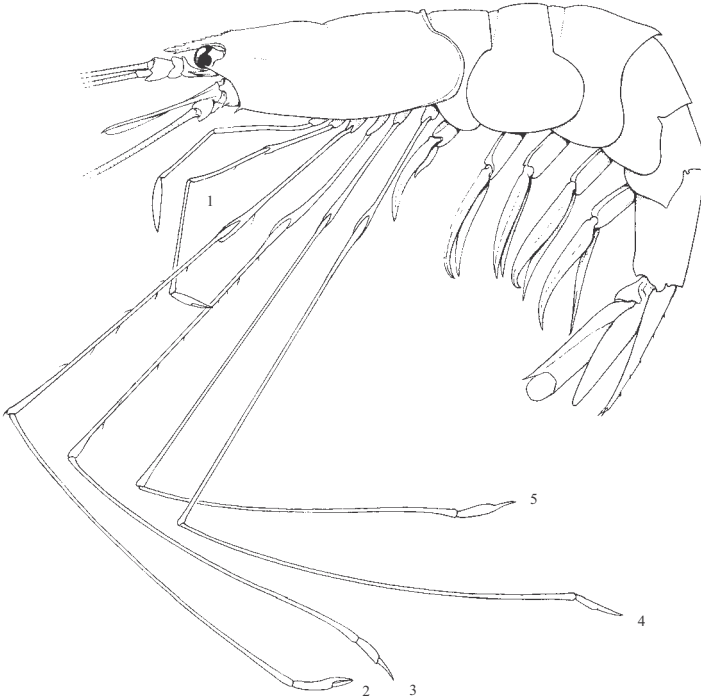


**Superfamily NEMATOCARCOIDEA**

**NEMATOCARCINIDAE**

**Spider shrimps**

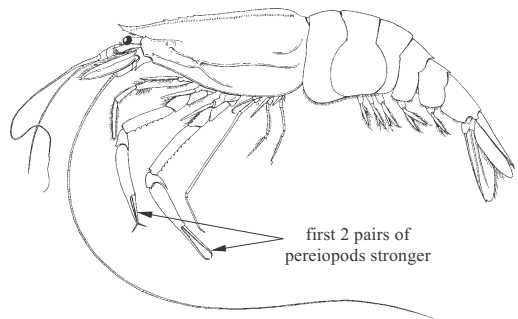
**Diagnostic characters:** Small to medium-sized, rather soft shrimps. Pleura of second abdominal segment overlap those of first and third segments, third pair of pereopods lack pincers. First two pairs of pereopods similar, **with unsegmented carpus, ending in pincers; last 3 pairs** (sometimes also second) **extremely elongate; exopods present on pereopods 1 to 4.** **Colour:** usually from pale orange to deep red.



**Habitat, biology, and fisheries:** Occurring in deeper waters, from the edge of the continental shelf to depths of about 3 000 m. Not commercially fished, but often caught with more commercially important species.

**Similar families occurring in the area**

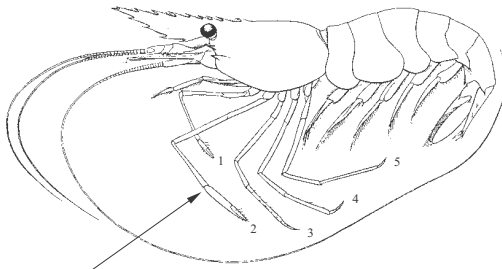
**Pasiphaeidae:** body strongly compressed; first 2 pairs of pereopods much larger and stronger than those of following pairs.



**Pasiphaeidae**

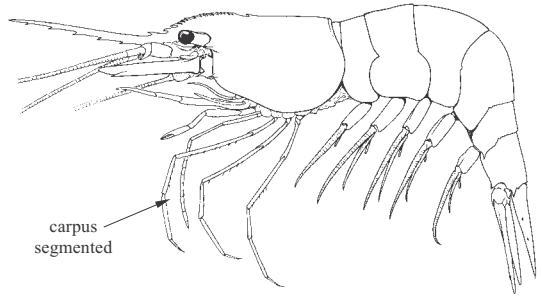
**Palaemonidae:** first pair of pereiopods with small pincers; second pair much better developed, bearing strong pincers.

**Hippolytidae:** first pair of pereiopods rather robust, ending in well-developed pincers; carpus in second pair segmented.



2<sup>nd</sup> pair of pereiopods with strong pincers

**Palaemonidae**

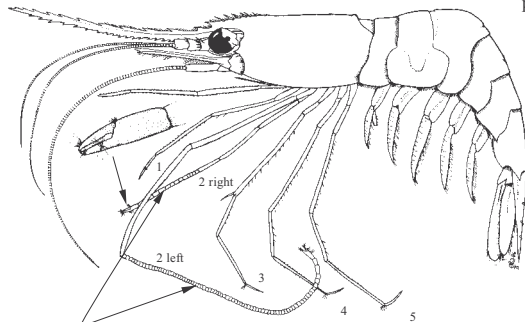


carpus segmented

**Hippolytidae**

**Pandalidae:** pincers of first pair of pereiopods very small or absent; carpus in second pair segmented.

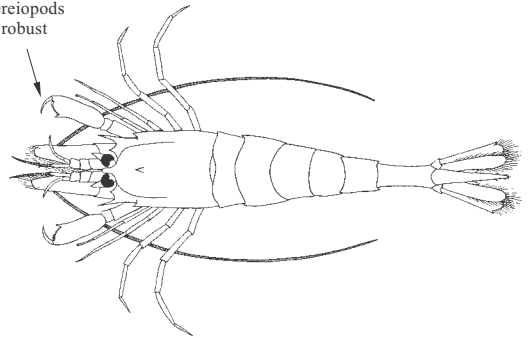
**Crangonidae:** first pair of pereiopods very robust with incomplete pincers lacking the fixed finger; body depressed.



carpus segmented

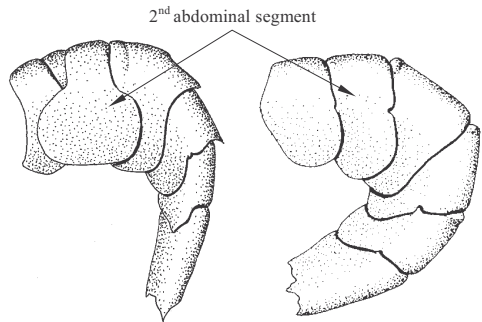
**Pandalidae**

1<sup>st</sup> pair of pereiopods robust



**Crangonidae**

**Penaeidean shrimps:** pleura of second abdominal segment not overlapping those of first segment; the 3 first pairs of pereiopods ending in pincers.



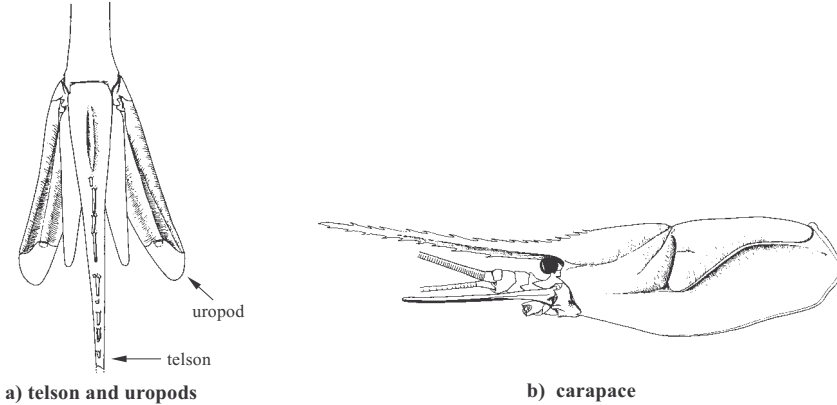
**Caridea**

**Penaeidae**

**abdomen**

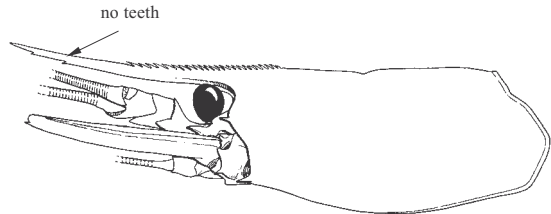
**Key to the species of Nematocarcinidae occurring in the area**

- 1a. Telson not reaching beyond the uropods, with 2 rows of small submedian spinules on dorsal surface; carapace smooth . . . . . → **2**
- 1b. Telson reaching far beyond the uropods, dorsal surface with a single median row of very long spines (Fig. 1a); carapace strongly sculptured (Fig. 1b) . . . . . ***Nigmatullinus acanthitelsonis***



**Fig. 1** *Nigmatullinus acanthitelsonis*

- 2a. Rostrum with at least its distal fourth without teeth (Fig. 2); 1 to 4 ventral rostral teeth . . . . . ***Nematocarcinus gracilipes***

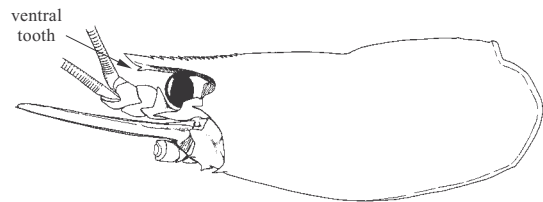


**Fig. 2** *Nematocarcinus gracilipes*

- 2b. Rostrum with teeth over entire dorsal margin; 0 to 2 ventral rostral teeth . . . . . → **3**

- 3a. Dorsal margin of rostrum with over 20 teeth; ventral margin unarmed. . . . . → **4**

- 3b. Dorsal margin of rostrum with less than 20 teeth, distal tip directed upward; ventral margin with 1 (seldom 2) subdistal teeth (Fig. 3) . . . . . ***Nematocarcinus africanus***



**Fig. 3** *Nematocarcinus africanus*

- 4a.** Tip of rostrum directed forward (Fig. 4a); posterior dorsal margin of third abdominal segment slightly produced (Fig. 4b) . . . . . *Nematocarcinus exilis*
- 4b.** Tip of rostrum directed upward (Fig. 5a); posterior dorsal margin of third abdominal segment strongly produced, overlapping fifth (Fig. 5b) . . . . . *Nematocarcinus ensifer*

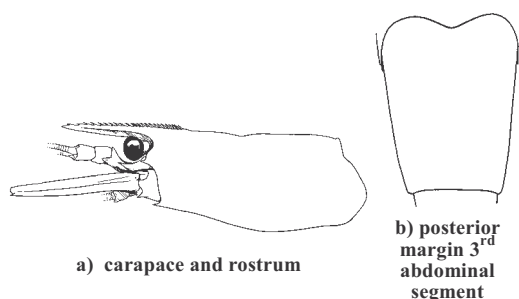


Fig. 4 *Nematocarcinus exilis*

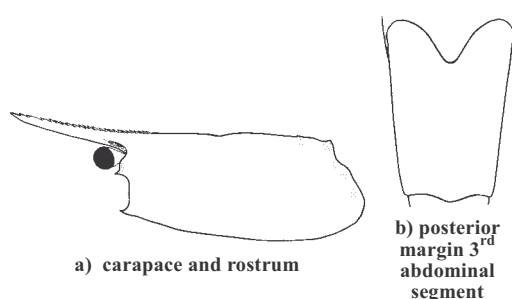




Fig. 5 *Nematocarcinus ensifer*

#### List of species occurring in the area

The symbol  is given when species accounts are included

-  *Nematocarcinus africanus* Crosnier and Forest, 1973.  
*Nematocarcinus ensifer* (Smith, 1882).  
*Nematocarcinus exilis* (Bate, 1881).  
*Nematocarcinus gracilipes* Filhol, 1884.  
*Nigmatullinus acanthitelsonis* (L.H. Pequegnat, 1970).

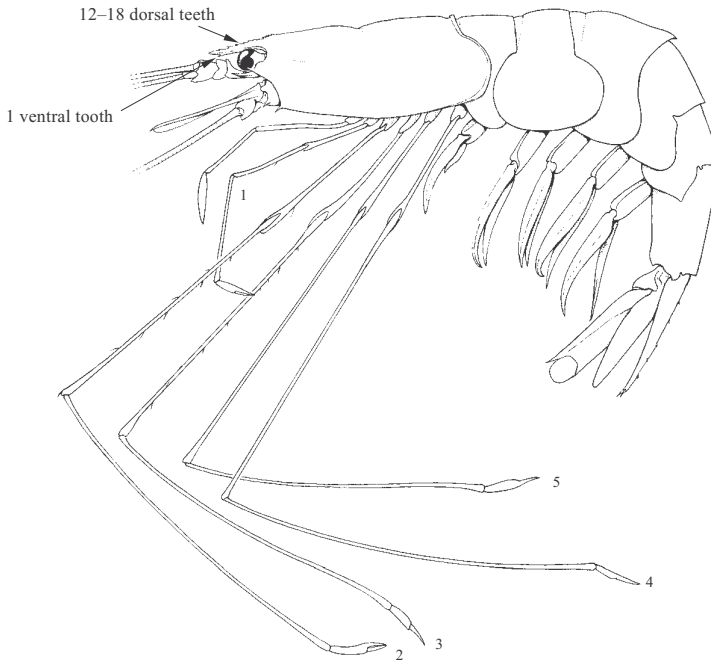
#### References

- Crosnier, A. & Forest, J.** 1973. Les crevettes profondes de l'Atlantique oriental tropical. *Faune Tropicale*, ORSTOM, Paris, 19: 1–409, figs 1–121.
- d'Udekem d'Acoz, C.** 1999. Inventaire et distribution des crustacés décapodes de l'Atlantique nord-oriental, de la Méditerranée et des eaux continentales adjacentes au nord de 25°N. Muséum National d'Histoire Naturelle, Paris, I–X: 1–383.
- Holthuis, L.B.** 1993. The recent genera of *Caridean* and *Stenopodidean* shrimps (Crustacea, Decapoda): with an appendix on the order Amphionidacea. Nationaal Natuurhistorisch Museum, Leiden, 1–328.

***Nematocarcinus africanus*** Crosnier and Forest, 1973

**Frequent synonyms / misidentifications:** None / *Nematocarcinus cursor* A. Milne Edwards, 1881 *sensu* Holthuis, 1951.

**FAO names:** **En** – African spider shrimp; **Fr** – Crevette araignée d'Afrique; **Sp** – Camarón araña africano.



**Diagnostic characters:** Dorsal margin of rostrum straight or slightly concave and **armed with 12 to 18 teeth**, 5 or 6 of which postorbital; **ventral margin with 1 strong tooth**, sometimes followed by second; tip slightly upward-pointing. First and second pairs of pereopods bearing pincers; **4 last pairs extremely long, spider-like**; epipods present on first 4 pairs. **Lower lobe of pleura of abdominal segment 5 bearing strong tooth posteriorly**, its posterior and lower margins forming a right angle. Telson little longer than abdominal segment 6, usually bearing 2 distal spines and 7 or 8 spinules, one of which located just behind bases of distal spines. **Colour:** pinkish red.

**Size:** Maximum total length: 10.4 cm.

**Habitat, biology, and fisheries:** A predominantly benthic species inhabiting only muddy bottoms in cold waters (5° to 12°C). Its vertical distribution varies with size, the older individuals occurring in the deeper part of its range. Caught at depths between 200 and 700 m, but most abundant between 300 and 600 m. Experimentally fished on muddy bottoms of the continental slope. A commercial fishery for this species has not yet started, despite some promising results of experimental fishing operations (i.e. the RV OMBANGO obtained yields of 85 kg/h at 400 m depth off Congo and Angola using a shrimp trawl of 12 m headline). Caught with bottom trawls. Not yet marketed; a rather fragile species that will require some care in handling.

**Distribution:** Eastern Atlantic: Senegal to Angola.



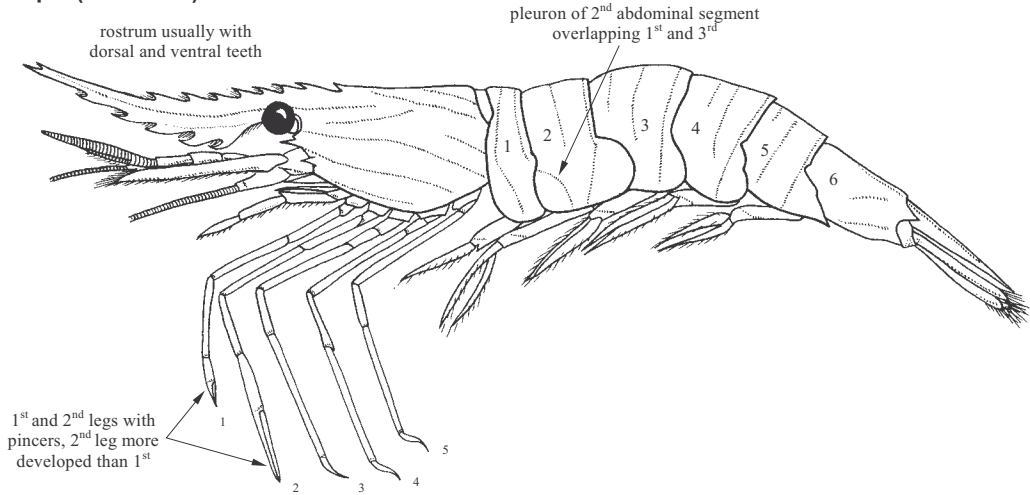


## Superfamily PALAEMONOIDEA

### PALAEMONIDAE

#### Palaemonid shrimps

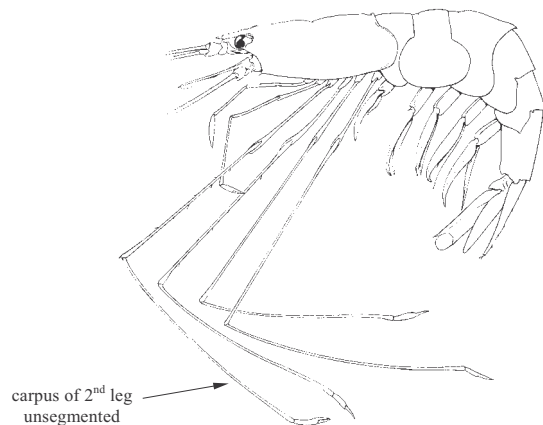
**Diagnostic characters:** As in the other families belonging to the infraorder Caridea, the pleura of the second abdominal segment overlap those of the first and third segments, and the third pair of pereiopods lacks pincers. The body is usually glabrous. Rostrum well developed with dorsal and ventral teeth in the commercially interesting species. Legs without exopods. **First pair of pereiopods ending in small pincers; those of second pair more developed, ending in strong, robust pincers, their carpus simple (undivided).**



**Habitat, biology, and fisheries:** This family includes marine as well as brackish-water and freshwater species. Of the 2 subfamilies Pontoniinae and Palaemoninae, only the latter includes species of commercial interest. Up to now, only few West African marine species are of some interest to fisheries. Several fresh and brackish water species are of local interest.

#### Similar families occurring in the area

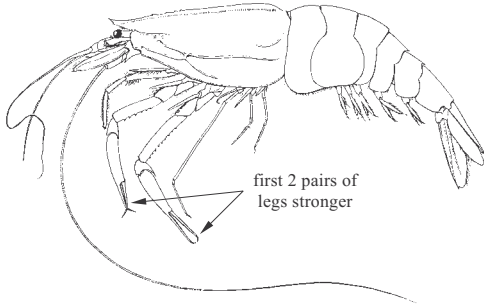
**Nematocarcinidae:** pincers of first 2 pairs of legs similar, third to fifth pairs of legs notably elongate.



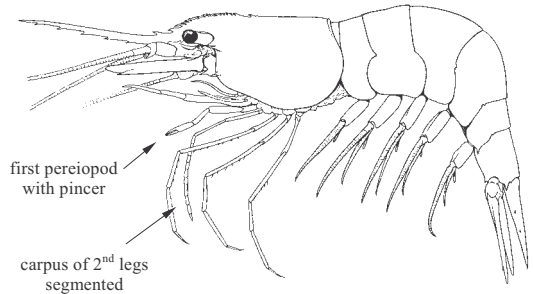
#### Nematocarcinidae

**Pasiphaeidae:** body strongly compressed; rostrum short; legs of first 2 pairs much larger and stronger than those of following pairs.

**Hippolytidae:** first pair of legs rather robust, ending in well-developed pincers; carpus in second pair of legs segmented.



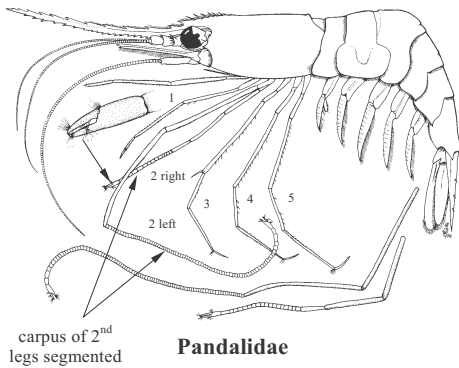
**Pasiphaeidae**



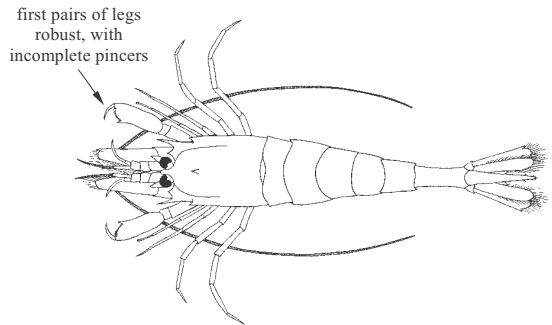
**Hippolytidae**

**Pandalidae:** first pair of legs with very small or no pincers; carpus in second pair segmented.

**Crangonidae:** first pair of legs very robust with incomplete pincers lacking the fixed finger; body depressed.

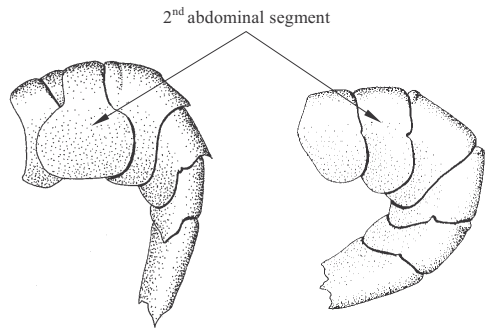


**Pandalidae**



**Crangonidae**

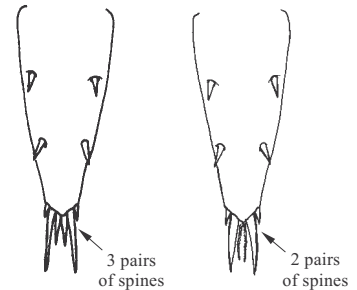
**Penaeidean shrimps:** pleura of second abdominal segment not overlapping those of first segment; the first 3 pairs of legs ending in pincers.



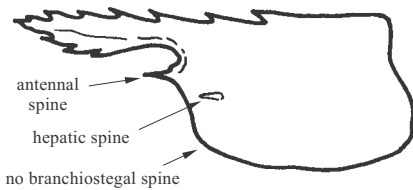
**Caridea** **abdomen** **Penaeidae**

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

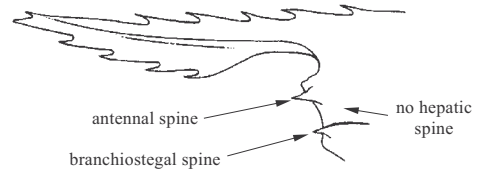
- 1a. Telson with 3 pairs of posterior spines (Fig. 1a); third maxilliped without pleurobranch . . . . . **Pontoniinae** (not treated further, includes mainly small commensal species)
- 1b. Telson with 2 pairs of posterior spines and 1 or more pairs of setae (Fig. 1b); third maxilliped with pleurobranch . . . . . **Palaemoninae** → 2
- 2a. Hepatic spine present; branchiostegal spine absent (Fig. 2a) . . . . . → 3
- 2b. Hepatic spine absent; branchiostegal spine present (Fig. 2b) . . . . . → 4



a) Pontoniinae      b) Palaemoninae  
**Fig. 1 telson in dorsal view**



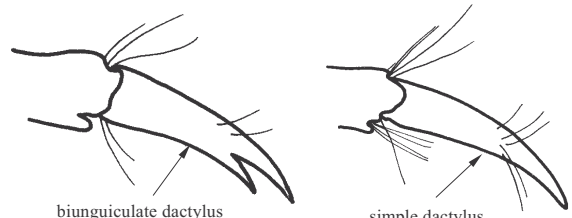
a) *Brachycarpus biunguiculatus*



b) *Palaemon adspersus*

**Fig. 2 anterior part of carapace**

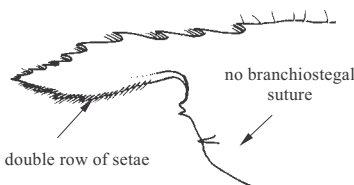
- 3a. Dactyli of pereopods 3 to 5 biunguiculate (Fig. 3a). . **Brachycarpus**
- 3b. Dactyli of pereopods 3 to 5 simple (Fig.3b) . . . . . **Macrobrachium**



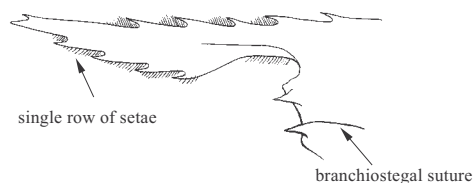
a) *Brachycarpus biunguiculatus*      b) *Macrobrachium*

**Fig. 3 dactylus of third to fifth legs**

- 4a. Rostrum with double row of setae on ventral margin, setae cover ventral teeth; no branchiostegal suture on carapace (Fig. 4a); male with appendix interna on first pleopods . . . . . **Leander**
- 4b. Rostrum with a single row of setae between ventral teeth; branchiostegal suture present (Fig. 4b); no appendix interna on first pleopods of males . . . . . → 5



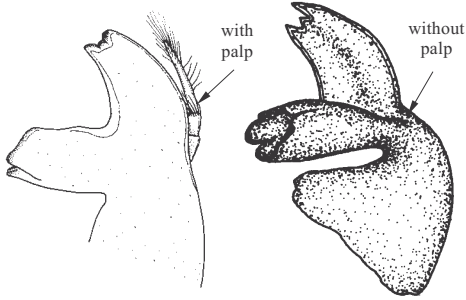
a) *Leander tenuicornis*



b) *Palaemon adspersus*

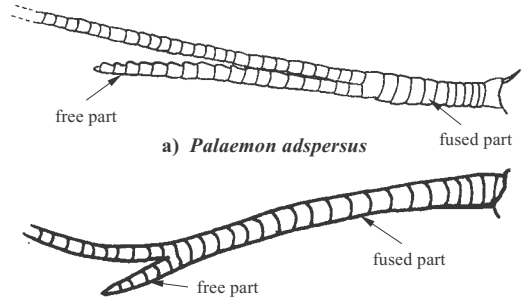
**Fig. 4 anterior part of carapace**

- 5a. Mandible with palp (Fig. 5a); rostrum with at least 3 ventral teeth; carpus of second pair of legs shorter than or as long as chela; free part of shorter ramus of outer antennular flagellum much longer than fused part (Fig. 6a) . . . . . → 6
- 5b. Mandible without palp; rostrum usually with 2 ventral teeth; carpus of second pair of legs longer than chela; free part of shorter ramus of outer antennular flagellum shorter than fused part (Fig. 6b) . . . . . ***Palaemonetes***



a) *Palaemon adspersus*    b) *Palaemonetes varians*

Fig. 5 mandible

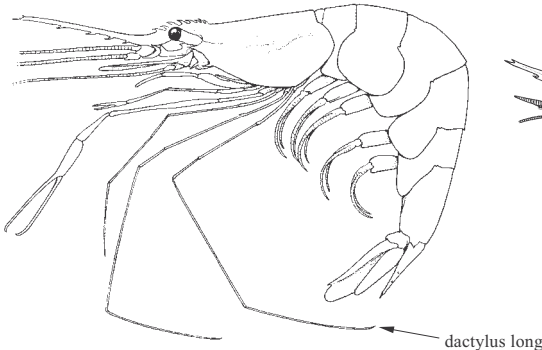


a) *Palaemon adspersus*

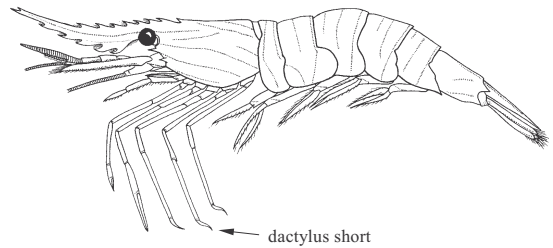
b) *Palaemonetes varians*

Fig. 6 outer antennular flagellum

- 6a. Dactyli of last 3 pereiopods enormously lengthened, about as long as propodus (Fig. 7a) . . . . . ***Nematopalaemon***
- 6b. Dactyli of last 3 pereiopods short, less than third of propodus length (Fig. 7b) . . . . . ***Palaemon***



a) *Nematopalaemon hastatus*

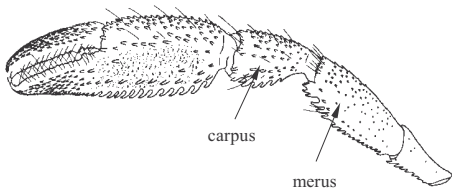


b) *Palaemon serratus*

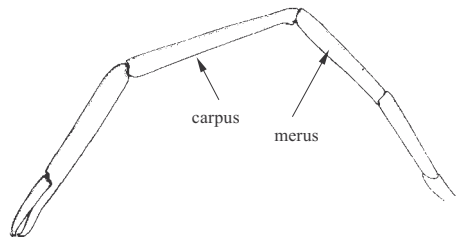
Fig. 7 dactylus third, fourth and fifth legs

**Key to the adult males of species of *Macrobrachium* occurring in the area**

- 1a. Carpus of second legs shorter than merus (Fig. 8a) . . . . . → 2
- 1b. Carpus of second legs as long as or longer than merus (Fig. 8b) . . . . . → 3



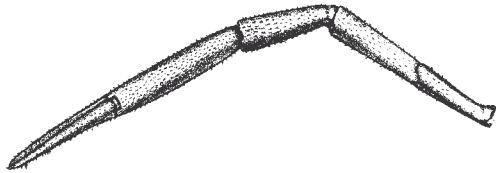
a) *Macrobrachium zariquieyi*



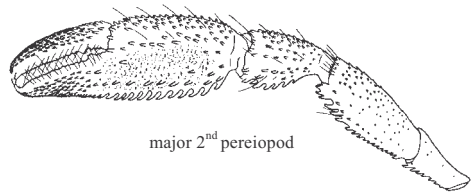
b) *Macrobrachium foi*

Fig. 8 chela second leg

- 2a. Second legs subequal (Fig. 9a)  
 . . . . . *Macrobrachium vollenhovenii*
- 2b. Second legs distinctly unequal  
 (Fig. 9b) . . . . . *Macrobrachium zariquieyi*



a) *Macrobrachium vollenhovenii*



major 2<sup>nd</sup> pereopod

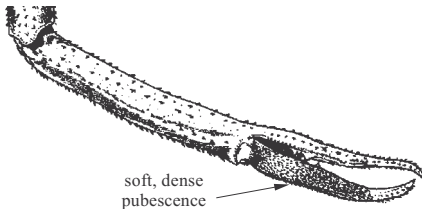


minor 2<sup>nd</sup> pereopod

b) *Macrobrachium zariquieyi*

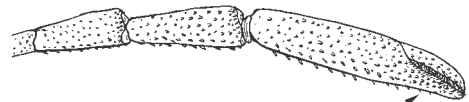
Fig. 9 chela second leg

- 3a. Finger(s) of second legs in males with soft, dense pubescence (Fig. 10a) . . . . . → 4
- 3b. Fingers of second legs in males without soft, dense pubescence (Fig. 10b) . . . . . → 6



soft, dense pubescence

a) *Macrobrachium rosenbergii*

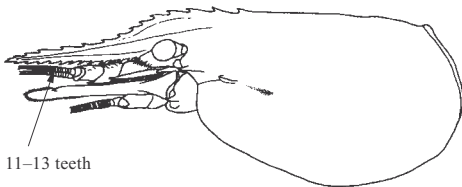


no pubescence

b) *Macrobrachium chevalieri*

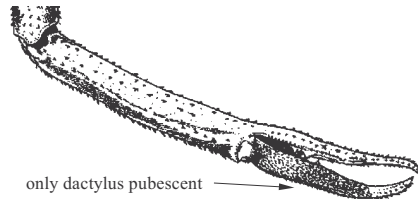
Fig. 10 chela second leg

- 4a. Ventral margin of rostrum with 11 to 13 teeth (Fig. 11a); posterior spines of telson not overreaching distal apex; only dactylus of second legs pubescent (Fig. 12a)  
 . . . . . *Macrobrachium rosenbergii*
- 4b. Ventral margin of rostrum with 4 to 7 teeth (Fig. 11b); posterior spines of telson overreaching distal apex; both fingers of second legs pubescent (Fig. 12b) . . . . . → 5



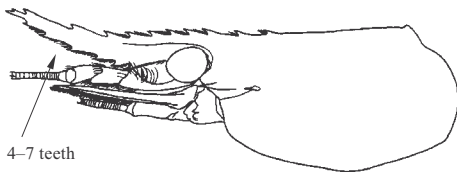
11-13 teeth

a) *Macrobrachium rosenbergii*



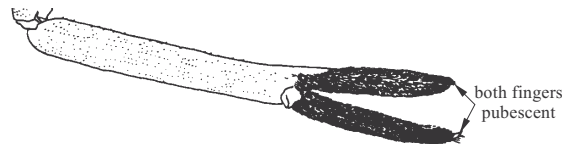
only dactylus pubescent

a) *Macrobrachium rosenbergii*



4-7 teeth

b) *Macrobrachium equidens*



both fingers pubescent

b) *Macrobrachium equidens*

Fig. 11 carapace and rostrum

Fig. 12 chela second leg

- 5a. Hepatic spine in horizontal line through antennal spine (Fig. 13a) . . . . . ***Macrobrachium equidens***
- 5b. Hepatic spine situated more ventrally in relation to antennal spine (Fig. 13b)  
 . . . . . ***Macrobrachium macrobrachion***



Fig. 13 anterior part of carapace

- 6a. Rostrum with 4 or 5 postorbital teeth (Fig. 14a) . . . . . → 7
- 6b. Rostrum with 0 to 3 postorbital teeth (Fig. 14b) . . . . . → 8

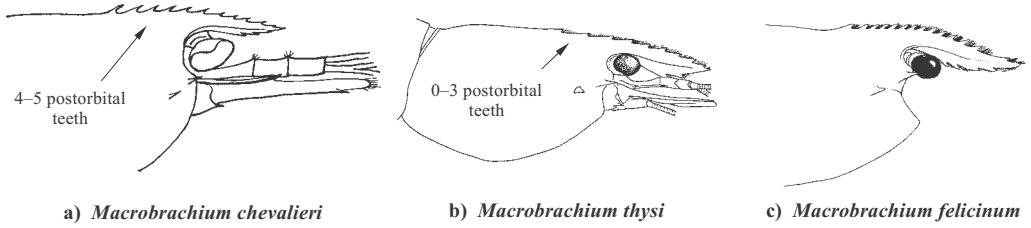


Fig. 14 anterior part of carapace

- 7a. Rostrum with at most 3 ventral teeth (Fig. 14a); palm of second leg cylindrical, not swollen (Fig. 15a) . . . . . ***Macrobrachium chevalieri***
- 7b. Rostrum with 4 to 7 ventral teeth (Fig. 14c); palm of second legs distinctly swollen (Fig. 15b) . . . . . ***Macrobrachium felicinum***

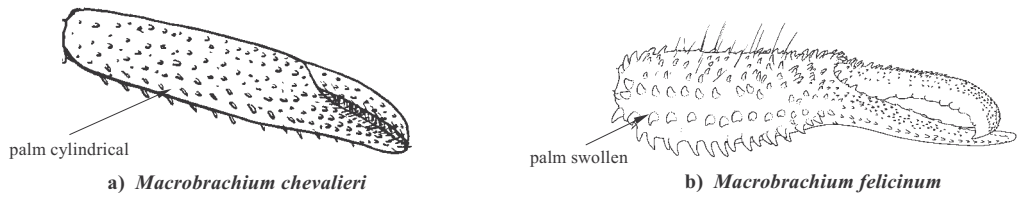


Fig. 15 chela second leg

- 8a. Anterior pair of dorsal telson spines situated in distal half of telson (Fig. 16a) . . . . . → 9
- 8b. Anterior pair of dorsal telson spines at half of telson length or in anterior half of telson (Fig. 16b) . . . . . → 10

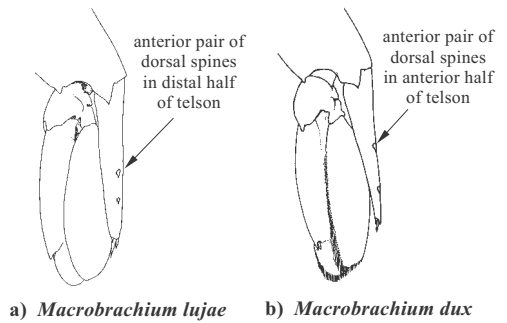


Fig. 16 telson

- 9a. Rostrum straight (Fig. 17a); dorsal spines on telson minute . . . . . *Macrobrachium foai*  
 9b. Rostrum sinuous (Fig. 17b); dorsal spines on telson of moderate size . . . *Macrobrachium lujae*

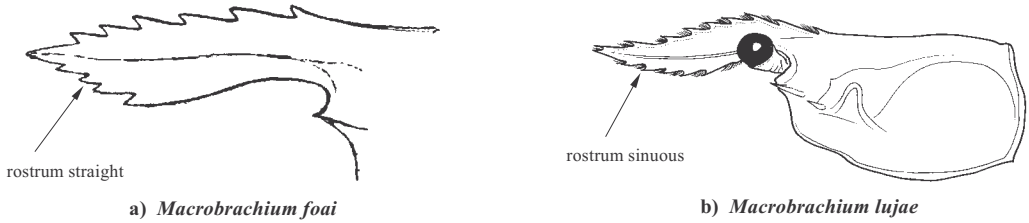


Fig. 17 rostrum

- 10a. Second legs with scattered tubercles (Fig. 18a) . . . . . *Macrobrachium thysi*  
 10b. Second legs with rows of tubercles (Fig. 18b) . . . . . → 11

- 11a. Palm of second pereiopods shorter than carpus (Fig. 18c) . . . . . *Macrobrachium sollaudii*  
 11b. Palm of second pereiopods longer than carpus (Fig. 18b) . . . . . → 12

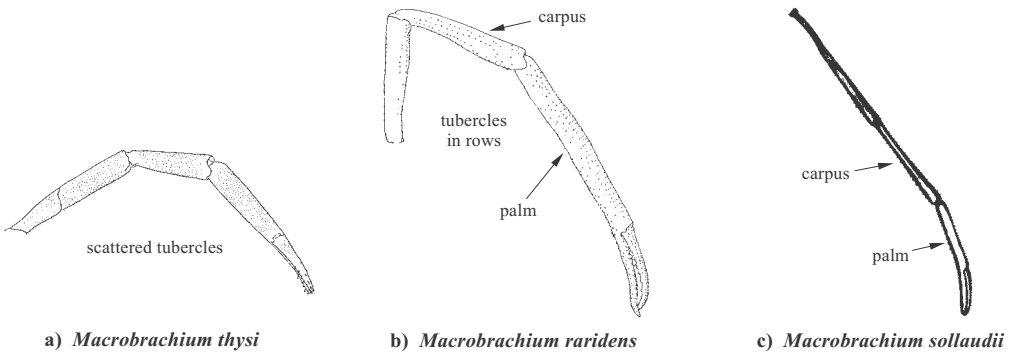


Fig. 18 second leg

- 12a. Rostrum without subapical tooth (Fig. 19a) . . . . . *Macrobrachium raridens*  
 12b. Rostrum with subapical tooth (Fig. 19b) . . . . . *Macrobrachium dux*

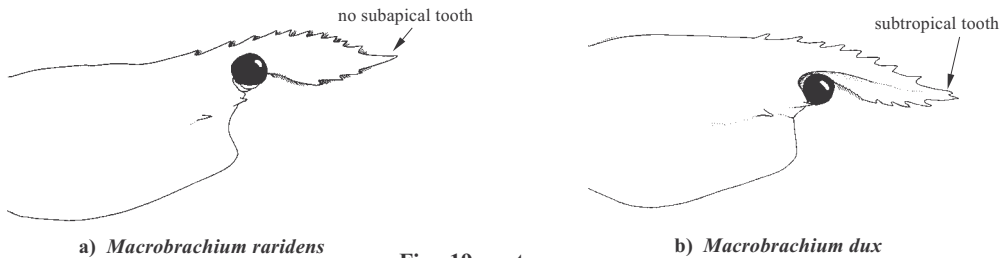


Fig. 19 rostrum

**Key to the species of *Palaemon* occurring in the area**

- 1a. Mandibular palp with 2 segments (Fig. 20a). . . . . → 2
- 1b. Mandibular palp with 3 segments (Fig. 20b). . . . . → 3

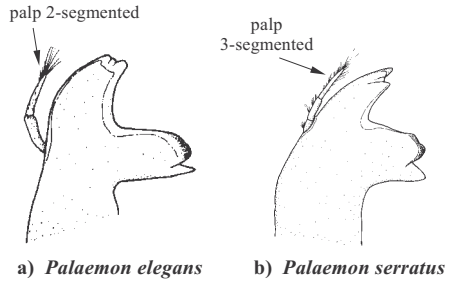


Fig. 20 mandible

- 2a. Rostrum with 7 to 9 dorsal teeth over entire length, 3 (occasionally 2) dorsal teeth behind posterior edge of orbit (Fig. 21a); second legs including fingers reaching beyond scaphocerite; chromatophores forming vertical pigment streaks on abdomen; marine or estuarine . . . ***Palaemon elegans***

- 2b. Rostrum with 6 to 8 dorsal teeth in proximal part, distal third devoid of teeth except for small subdistal tooth; 1 tooth behind orbit (Fig. 21b); second legs reaching with chela and distal part of carpus beyond scaphocerite; brackish water species . . . ***Palaemon maculatus***

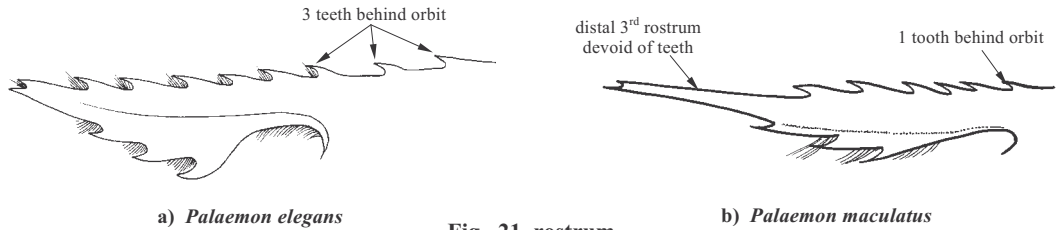


Fig. 21 rostrum

- 3a. Rostrum with distinct upward curve, dorsal teeth (subdistal ones excepted) not extending into distal third (Fig. 22a) . . . . . → 4
- 3b. Rostrum straight, or nearly so, with dorsal teeth extending into distal third (Fig. 22b) . . . . . → 5

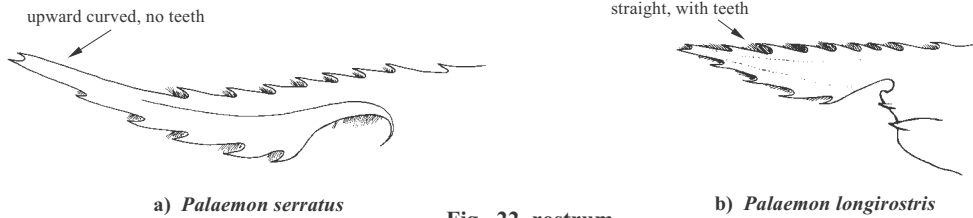


Fig. 22 rostrum

- 4a. Branchiostegal spine marginal (Fig. 23a) . . . . . ***Palaemon serratus***
- 4b. Branchiostegal spine distinctly submarginal (Fig. 23b); colour uniformly green, yellowish or brownish; marine, living among seagrass (*Zostera*) . . . . . ***Palaemon xiphias***

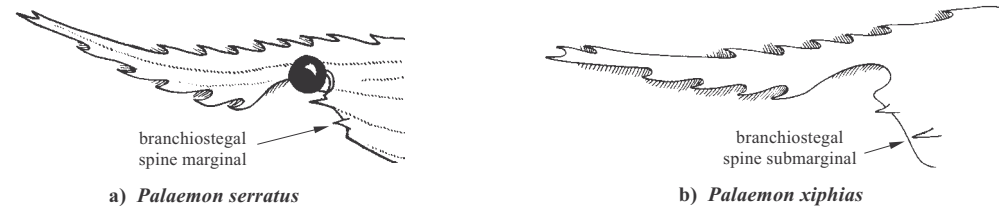


Fig. 23 branchiostegal spine



- 5a. Rostrum with 7 to 15 dorsal rostral teeth (excluding subdistal tooth), of which 2 to 4 lie behind the posterior edge of the orbit (Fig. 24a); most posterior tooth about 1.5 times more distant from first than from next distally . . . . . → 6
- 5b. Rostrum with 5 or 6 dorsal teeth (excluding subdistal tooth) and 3 (rarely 2 or 4) ventral teeth; 1 dorsal tooth behind posterior edge of orbit, second tooth often directly above edge (Fig. 24b); lower half of rostrum with scattered red pigment spots; carpus of pereiopod 2 about 1.2 times length of merus; brackish water species . . . . . *Palaemon adspersus*

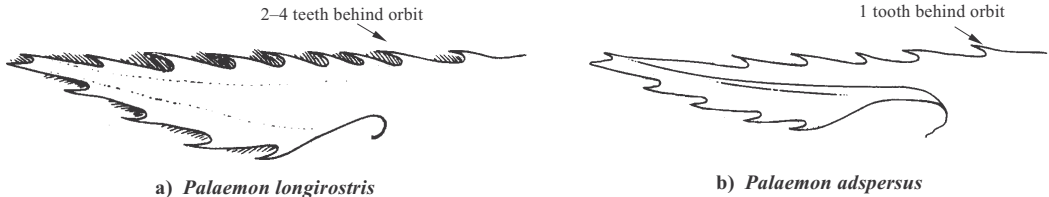


Fig. 24 rostrum

- 6a. Rostrum with 7 or 8 (exceptionally up to 12) dorsal rostral teeth (excluding subdistal tooth), of which 2 lie behind the posterior edge of the orbit (Fig. 24a); 3 to 6 (usually 3 or 4) ventral teeth; few setae between dorsal rostral teeth; shorter ramus of antennular flagellum fused for third of its length to longer ramus (Fig. 25a); carpus of pereiopod 2 equal or slightly longer than merus; palm slender; brackish water species found in upper reaches of estuaries . . . . . *Palaemon longirostris*

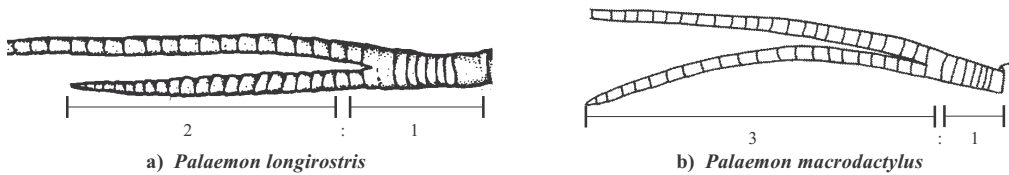


Fig. 25 outer antennular flagellum

- 6b. Rostrum with 9 to 15 (usually 10 to 12) dorsal rostral teeth (excluding subdistal teeth), of which 3 (seldom 4) behind posterior edge of orbit (Fig. 26), and with 3 to 5 (usually 4) ventral teeth; rostrum strongly setose between rostral teeth; shorter ramus of antennular flagellum fused for a quarter of its length to longer ramus (Fig. 25b); carpus of pereiopod 2 equal of slightly shorter than merus; palm broad; commonly estuarine . . . . . *Palaemon macrodactylus*

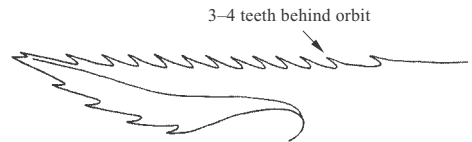


Fig. 26 *Palaemon macrodactylus*

### List of species occurring in the area


The symbol  is given when species accounts are included.

*Brachycarpus biunguiculatus* (Lucas, 1849).

*Leander tenuicornis* (Say, 1818).

*Macrobrachium chevalieri* (J. Roux, 1935).

 *Macrobrachium dux* (Lenz, 1910).

 *Macrobrachium equidens* (Dana, 1852).

 *Macrobrachium felicinum* Holthuis, 1949.

*Macrobrachium foai* (Coutière, 1902).

*Macrobrachium lujae* (De Man, 1912).

 *Macrobrachium macrobrachion* (Herklots, 1851).

 *Macrobrachium raridens* (Hilgendorf, 1893).

 *Macrobrachium rosenbergii* (De Man, 1879).

*Macrobrachium sollaudii* (De Man, 1912).

*Macrobrachium thysi* Powell, 1980.

 *Macrobrachium vollenhovenii* (Herklots, 1857).

*Macrobrachium zariquieyi* Holthuis, 1949.

 *Nematopalaemon hastatus* (Aurivillius, 1898).

 *Palaemon adspersus* Rathke, 1837.

 *Palaemon elegans* Rathke, 1837.

 *Palaemon longirostris* H. Milne Edwards, 1837.

 *Palaemon macrodactylus* Rathbun, 1902.

 *Palaemon maculatus* (Thallwitz, 1892).

 *Palaemon serratus* (Pennant, 1777).

 *Palaemon xiphias* Risso, 1816.

 *Palaemonetes varians* (Leach, 1814).

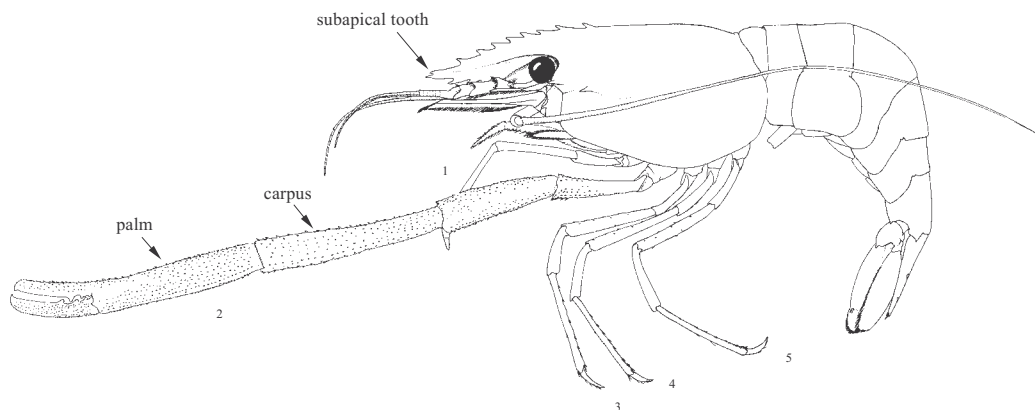
### References

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- Holthuis, L.B.** 1993. The recent genera of Caridean and Stenopodidean shrimps (Crustacea, Decapoda): with an appendix on the order Amphionidacea. Nationaal Natuurhistorisch Museum, Leiden. 1–328 pp.

***Macrobrachium dux* (Lenz, 1910)**

**Frequent synonyms / misidentifications:** *Palaemon (Eupalaemon) lenzii* De Man, 1911; *P. (Eupalaemon) dux* var. *congoensis* De Man, 1912; *P. (Eupalaemon) dux* var. *tenuicarpus* De Man, 1925 / None.

**FAO names:** **En** – Congo river prawn; **Fr** – Bouquet congolais; **Sp** – Camarón congoleño.



**Diagnostic characters:** Carapace with antennal and hepatic spines, branchiostegal spines absent. Rostrum almost straight, slightly upturned distally, reaching to or just beyond scaphocerite; dorsal lamina slightly elevated proximally, **with 7 to 10 (usually 7 or 8) teeth of which 1 or 2 are postorbital, anteriormost (rarely 2) tooth subapical**, distal one-fourth to one-fifth of rostrum without teeth; ventral margin with 2 to 7 equidistant teeth. Second legs in adult male long, robust, subequal, carpus and chela extending beyond scaphocerite, **spinulose in all segments**; fingers between 0.6 and 0.8 of palm length, slender, slightly gaping, with about 3 large teeth in proximal part of cutting edge, **no pubescence**; palm cylindrical, **carpus usually slightly shorter than, but sometimes equal to palm length**, club-shaped, merus shorter than carpus, ischium shorter than merus. Telson ending in acute triangular point, overreached by inner pair of terminal spines; **anterior pair of dorsal telson spines at half of telson length**. **Colour:** body dark brown to almost black; rostrum translucent.

**Size:** Maximum carapace length 5.5 cm (male), 3 cm (female).

**Habitat, biology, and fisheries:** This is a fresh-water species. Its commercial value is minor. It has been found on fishmarkets in Kinshasa, Congo.

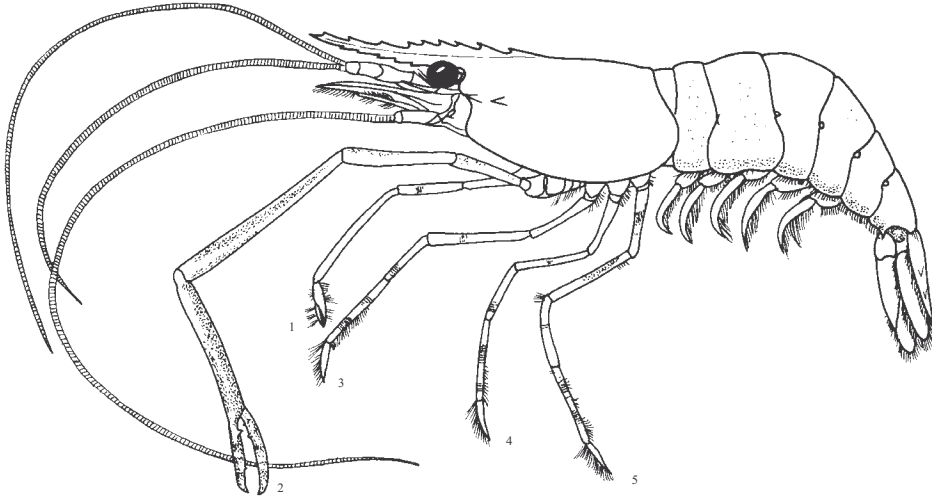
**Distribution:** Eastern Atlantic: West Africa from Equatorial Guinea, Gabon to Congo.



***Macrobrachium equidens* (Dana, 1852)**

**Frequent synonyms / misidentifications:** *Palaemon sundaicus* var. *batavia* De Man, 1897; *P. (Eupalaemon) sundaicus* var. *branchydactyla* Nobili, 1899; *P. (Eupalaemon) acanthosoma* Nobili, 1899; *P. (Eupalaemon) sundaicus* var. *baramensis* De Man, 1902; *P. (Eupalaemon) nasutus* Nobili, 1903; *P. sulcatus* Henderson and Matthai, 1910 / None.

**FAO names:** **En** – Rough river prawn; **Fr** – Bouquet chagrin; **Sp** – Camarón Iija.



**Diagnostic characters:** Rostrum reaching nearly as far as or beyond level of distal end of antennal scale, dorsal margin convex or slightly sinuous; **with 2 to 4 postorbital teeth and 7 to 9 on rostrum proper; with 4 to 7 ventral teeth**, dorsal teeth unequally spaced, usually with wider gaps near posterior and anterior end of series; branchiostegal suture not extending posteriorly beyond hepatic spine; **hepatic spine in horizontal alignment with antennal spine**. Tip of telson not extending beyond posterolateral spines; antennal scale with lateral margin straight or convex; first legs with chela half as long as carpus; second legs subequal in length, similar in form, palm cylindrical, **fingers covered with soft, dense pubescence**, not dentate on opposable margins, not gaping (in full-grown males), about 0.75 times as long as palm, latter completely naked, without pubescence, chela longer than carpus, palm 0.66 to 0.75 times as long as carpus, **carpus 1.66 to 1.75 times as long as merus**, without antennal longitudinal grooves; third legs extending beyond scaphocerite by length of dactylus, propodus partially pubescent, not covered with spines or scales. **Colour:** translucent, marbled or spotted with greyish, greenish or reddish. Second pair of pereopods, and especially the palms, marbled with dark brownish (tortoise shell-like).

**Size:** Maximum total length 9.8 cm.

**Habitat, biology, and fisheries:** Occurring in lower parts of streams, river mouths, estuaries and brackish waters of high salinity; rarely found in pure fresh water but often in sea water (near river mouths) to a depth of at least 30 m. Reproduce in brackish and sea water, larvae have about 11 stages and transform into postlarvae in 43 days. Potentially of local importance in the area. Of local commercial interest in India, Indonesia, Viet Nam and the Philippines. Caught with traps and cast nets. Introduced in Nigeria, but nothing known about its present commercial value there. Marketed fresh or dried.

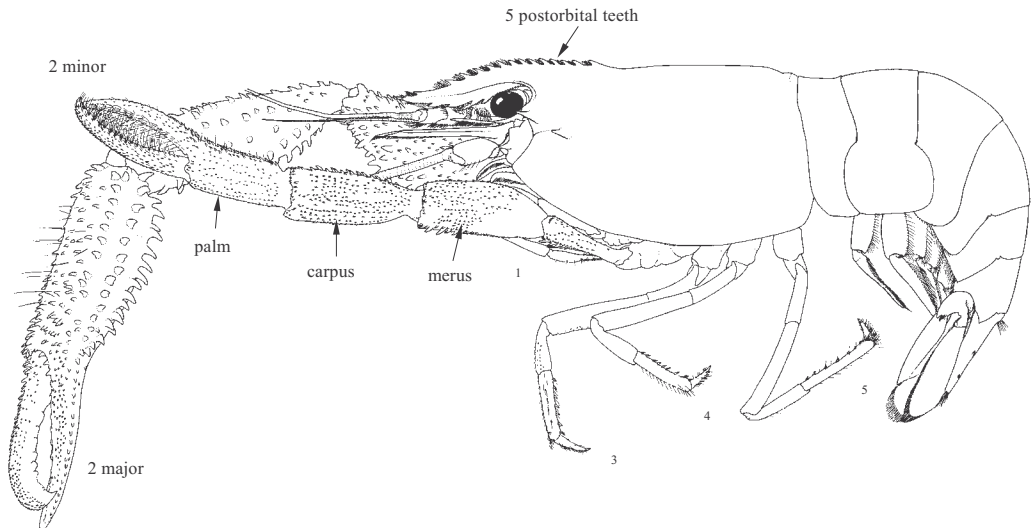
**Distribution:** West Africa: introduced in Nigeria, recorded for the first time in 1982. Indo-West Pacific: Madagascar to southern China, New Britain and New Caledonia.



***Macrobrachium felicinum* Holthuis, 1949**

**Frequent synonyms / misidentifications:** None / *Palaemon (Macrobrachium) olfersii* De Man, 1904.

**FAO Names:** **En** – Niger river prawn; **Fr** – Bouquet niger; **Sp** – Camarón del Niger.



**Diagnostic characters:** Carapace smooth, with antennal and hepatic spines, branchiostegal spine absent. Rostrum distally upturned, about as long as antennal peduncle, distinctly shorter than scaphocerite; with 14 to 17 small, equal, equidistant dorsal teeth of which **5 are postorbital**; **4 to 7 ventral teeth**. Second pair of pereiopods in adult males very unequal, both in shape and size; major cheliped extending beyond scaphocerite with chela, carpus and distal part of merus; all segments with curved acute spines; **palm swollen**; **fingers without velvety pubescence**, about as long as or slightly longer than palm, slender; **carpus much shorter than chela, slightly longer than merus**; ischium about half as long as merus. Telson ending in acute triangular point, about as long as inner pair of terminal spines. **Colour:** not known.

**Size:** Maximum total length about 9 cm.

**Habitat, biology, and fisheries:** The species lives in fresh and brackish water. It is being captured in Ghana. Its interest for fisheries is minor.

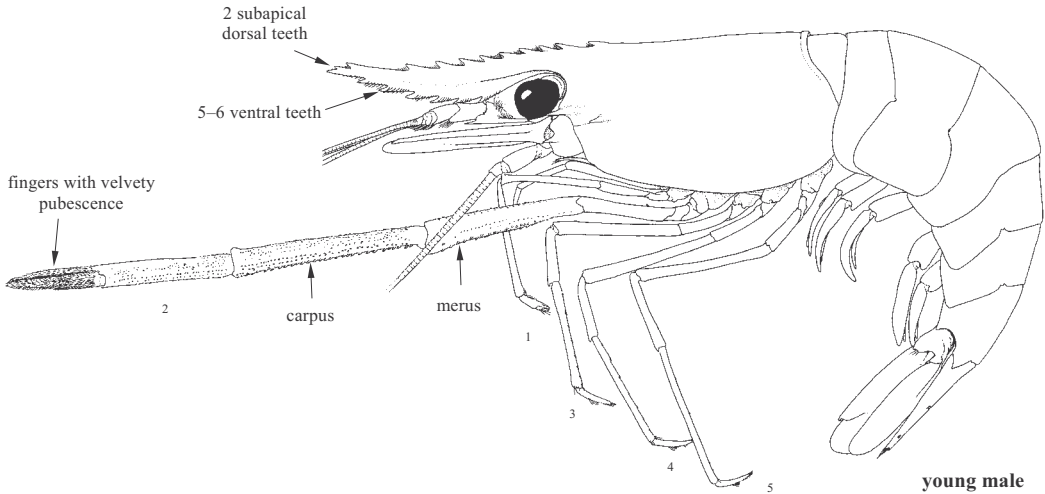
**Distribution:** Eastern Atlantic: West Africa from Senegal to northern Angola.



***Macrobrachium macrobrachion* (Herklots, 1851)**

**Frequent synonyms / misidentifications:** *Palaemon africanus* Kingsley, 1882; *P. (Eupalaemon) macrobrachion* De Man, 1904 / None.

**FAO names:** En – Brackish river prawn; Fr – Bouquet saumâtre; Sp – Camarón salobreño.



**Diagnostic characters:** Carapace smooth, with antennal and hepatic spines, **hepatic spine situated more ventrally than antennal spine**, branchiostegal spine absent. Rostrum almost straight, slightly shorter to slightly longer than scaphocerite; **with 9 to 12 equidistantly spaced dorsal teeth of which 1 to 3 (rarely none) are postorbital and 2 subapical slightly separated**; ventral margin with 5 or 6 equidistantly spaced teeth. Second pair of legs in adult males robust, long, slender, **subequal in size, subequal in shape**; reaching with about two-thirds to three-fourth of merus extending beyond scaphocerite in larger specimens; **all segments except fingers with longitudinal rows of tubercles, most prominent on lower margins; fingers slightly less to slightly more than half length of palm, slender, with velvety pubescence on all surfaces**; palm cylindrical, without pubescence; carpus slightly shorter than to about as long as chela; merus about two-thirds length of carpus, slightly swollen; ischium about half size of merus. Telson ending in acute triangular point, **distinctly falling short of inner pair of terminal spines**. **Colour:** body and appendages brownish to greyish speckled.

**Size:** Maximum total length 7.8 cm (female).

**Habitat, biology, and fisheries:** Occurs in fresh and brackish water. Of local interest for fisheries, although of some importance in Liberia, Nigeria and Guinea. The major fishing season in Nigeria is between July and September. Because of its small size it is of less importance than *Macrobrachium vollehovenii* and is mostly eaten by the fishermen themselves.

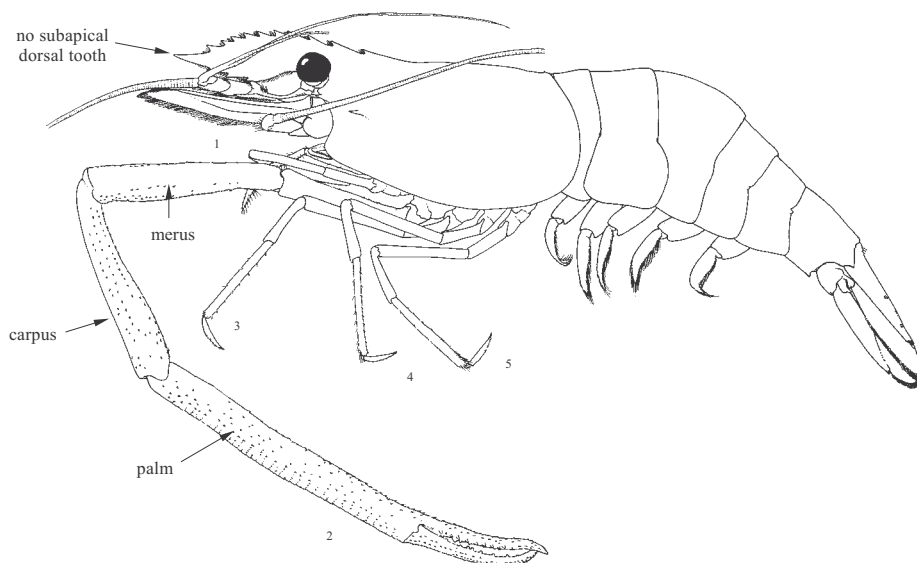
**Distribution:** Eastern Atlantic: West Africa from Senegal to northern Angola.



***Macrobrachium raridens* (Hilgendorf, 1893)**

**Frequent synonyms / misidentifications:** *Palaemon (Eupalaemon) paucidens* Hilgendorf, 1893; *Bithynis paucidens* - Rathbun, 1900 / None.

**FAO names:** **En** – Volta river prawn; **Fr** – Bouquet volta; **Sp** – Camarón del Volta.



**Diagnostic characters:** Carapace smooth, with antennal and hepatic spines, branchiostegal spines absent. Rostrum proximally straight, slightly upcurved in distal part, reaching beyond antennular peduncle, not beyond scaphocerite; **dorsal lamina elevated in proximal part, with 8 to 13 more or less equidistantly spaced teeth of which 2 or 3 teeth are postorbital, proximalmost tooth often slightly separated from others, distal fifth of lamina without teeth (sometimes a tooth is present); ventral margin with 3 teeth. Second pair of legs equal in size and shape, long and slender, chela, carpus and distal third of merus extending beyond scaphocerite in adult males, spinulose on all segments, spines more prominent on lower and inner surfaces; fingers without pubescence, half length of palm, with 3 or 4 blunt conical teeth in proximal part and row of 7 to 15 (or more) tubercular teeth distally; palm almost cylindrical; carpus 0.6 to 0.8 times palm length, club-shaped, merus almost as long as carpus, ischium about 0.6 times as long as merus. Telson ending in acute triangular median point, inner pair of terminal spines extending beyond telson; anterior pair of dorsal spines in anterior half of telson. Colour: not known.**

**Size:** Not sex-related. Maximum total length 15 cm.

**Habitat, biology, and fisheries:** Occurs in fresh water. The interest to fisheries is minor. Caught in Guinea and Ghana with fish traps. Marketed cooked, whole or peeled, and sometimes dried.

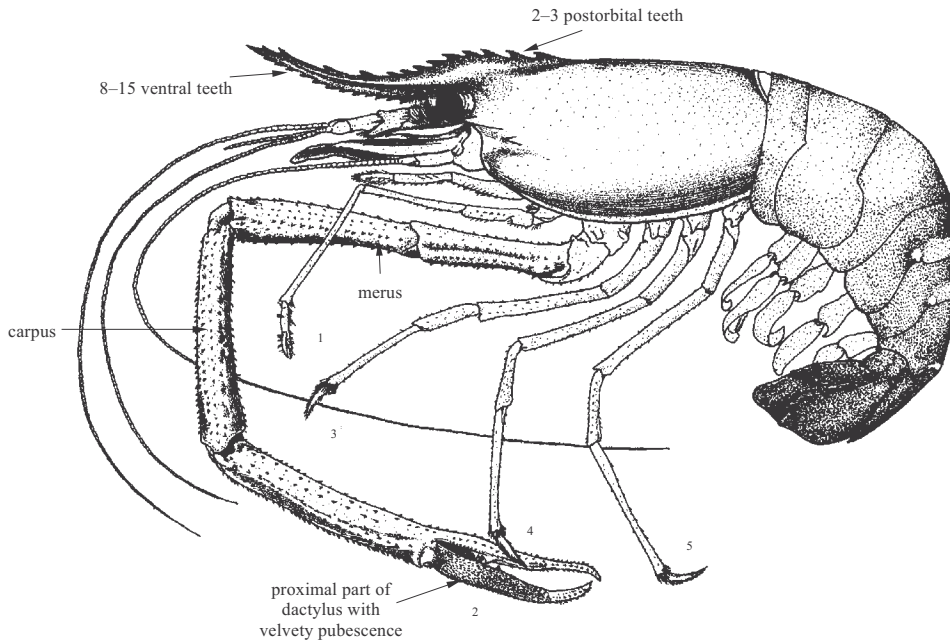
**Distribution:** Eastern Atlantic: West Africa from Gambia to Nigeria.



***Macrobrachium rosenbergii* (De Man, 1879)**

**Frequent synonyms / misidentifications:** *Palaemon carcinus rosenbergii* Ortmann, 1891; *Palaemon whitei* Sharp, 1893 nomen nudum; *P. (Eupalaemon) rosenbergii* Nobili, 1899; *P. spinipes* Schenkel, 1902 [not *P. spinipes* Desmarest, 1817]; *P. carcinus* Cowles, 1914 [not *Cancer carcinus* Linnaeus, 1758]; *Palaemon d'Acqueti* Sunier, 1925; *Cryphiops (Macrobrachium) rosenbergii* Johnson, 1966. In the older literature the species is often, but incorrectly, indicated with the name *Palaemon carcinus*.

**FAO names:** En – Giant river prawn; Fr – Bouquet géant; Sp – Langostino de río.



**Diagnostic features:** Rostrum extending beyond antennal scale or not, dorsal margin variably sinuous, with 9 to 11 dorsal teeth on rostrum proper and 2 or 3 postorbital teeth, dorsal teeth unequally spaced; ventral margin with 8 to 15 equidistantly spaced teeth; branchiostegal suture not extending posteriorly beyond hepatic spine; scaphocerite with lateral margin straight; first legs with chela less than half as long as carpus; second legs subequal in length but similar in form, palm subcylindrical or somewhat compressed, **movable finger clothed in dense pubescence on proximal three-fourth of length (in adults), fixed finger without pubescence**, fingers dentate on proximal half of opposable margins (in adults), somewhat gaping in large males, three-fourth to as long as palm, palm without any dense pubescence, chela up to 1.75 times as long as carpus, palm 0.5 to 1.0 times as long as carpus, **carpus about 1.5 times as long as merus**, with indistinct longitudinal groove; third legs extending beyond scaphocerite by length of dactylus, propodus bearing numerous spines or sharp scales. **Posterior spines of telson not overreaching distal apex.** **Colour:** specimens with carapace length over 23 mm have the carapace and abdomen uniformly translucent olive grey to greyish blue. Specimens with carapace lengths between 15 and 23 mm have several black bands on the carapace; several dark blue areas visible near margins of the abdomen segments, telson and uropods, and reddish brown (= dark orange) markings present on each pleural condyle.

**Size:** Maximum total length 34 cm (male), 26 cm (female), maximum postorbital carapace length about 10 cm. Specimens of 25 cm length weigh about 250 g.



**Habitat, biology, and fisheries:** Fresh and brackish water, sometimes marine. The species requires brackish water for spawning and metamorphosis to postlarval stage; juveniles are caught mostly in freshwater, including (mouths of) big rivers, lakes, reservoirs and irrigation channels. Females can carry up to 120 000 eggs. Largest species of the Palaemonidae. Of major commercial interest in aquaculture. The species is economically exploited in the Indo-West Pacific and along the east coast of Africa. There is a growing interest in culturing the species all over the world. It is successfully cultured in Senegal with a production of 22 tonnes per year in 1998. Interest in farming of *Macrobrachium rosenbergii* has been shown in Côte d'Ivoire, Ghana, Sierra Leone and Namibia.

**Distribution:** Eastern Atlantic: Senegal. Indo-West Pacific: East Pakistan and northwest India east to Viet Nam and southern China, Java and Borneo. The species is widely introduced elsewhere throughout the tropical and subtropical parts of the world in propagation operations.

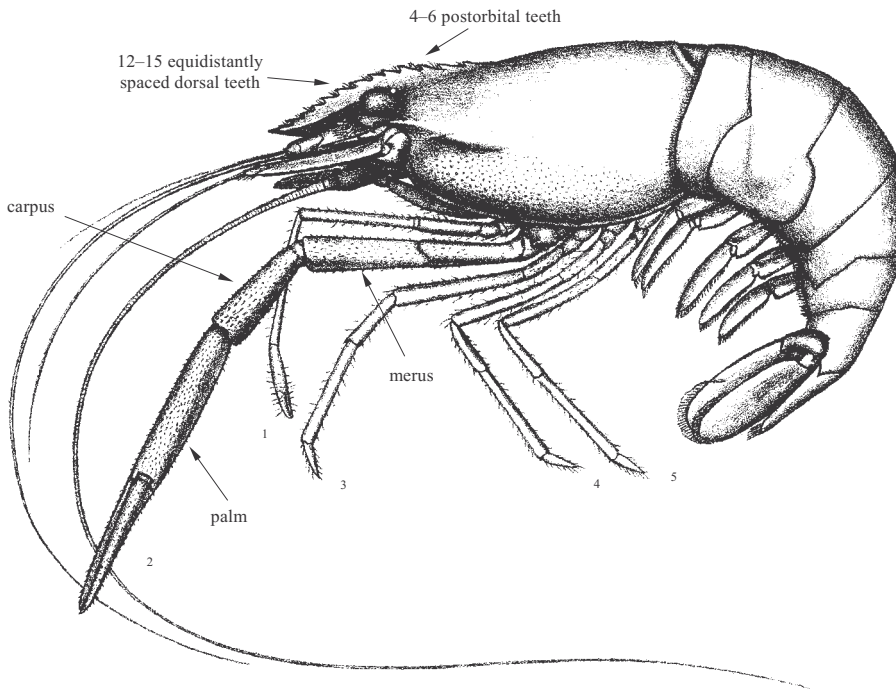


**Remarks:** Recently it has become clear that what has been called *Macrobrachium rosenbergii* actually belongs to two separate species, easily separated by a number of diagnostic adult morphological characters (Wower and Ng, 2007. *The Raffles Bulletin in Zoology* 2007, 55(2): 321–336). *M. rosenbergii* (de Man, 1897) sensu stricto occurs in Australia, Papua New Guinea, eastern Indonesia (east of Huxley's line including Bali) and the Philippines (including Palawan). The second species, which is actually the one more widely fished and extensively cultured in America, Asia and Africa, is identified as *M. dacqueti* (Sunier, 1925). Wower and Ng have sent an application to the International Commission for Zoological Nomenclature to have the name *M. dacqueti* (Sunier, 1925) suppressed under *M. rosenbergii* (de Man, 1879) by suppressing the holotype of *M. rosenbergii*. The Australian, Philippine and Papuan species would then have to be given a new name with a new holotype as there are no other available names. This should, however, cause far less confusion as the species in the area is only rarely utilized for research purposes. This act will conserve the name *M. rosenbergii*, familiar to most giant prawn biologists. In Opinion 2253 (case 3428, September 2010), the Commission has conserved usage of the specific name of *Macrobrachium rosenbergii* (De Man, 1879) by setting aside previous type fixations and designating a neotype for the nominal species *Palaemon rosenbergii* De Man, 1879.

***Macrobrachium vollenhovenii* (Herklots, 1857)**

**Frequent synonyms / misidentifications:** *Palaemon jamaicensis africanus* Bouvier, 1895; *P. (Bithynis) jamaicensis vollenhovenii* Lönnberg, 1903; *P. (Macrobrachium) jamaicensis angolensis* De Man, 1904; *P. (Parapalaemon) vollenhovenii* De Man, 1912; *P. (Macrobrachium) jamaicensis herklotsii* De Man, 1912; *P. (Macroterocheris) jamaicensis herklotsii* De Man, 1925 / None.

**FAO names:** En – African river prawn; Fr – Bouquet africain; Sp – Camarón africano.



**Diagnostic characters:** Carapace smooth, with antennal and hepatic spines, without branchiostegal spine. Rostrum slightly upcurved distally, almost reaching to or just extending beyond scaphocerite, always extending beyond antennular peduncle; dorsal lamina slightly elevated over eye, **with 12 to 15 more or less equidistantly spaced teeth of which 4 to 6 (rarely 3) teeth are postorbital; ventral margin with 2 to 6 (usually 4) teeth.** Second pair of legs in adult males robust, subequal in size and shape, distal half to one-fifth of merus to chela extending beyond scaphocerite; spinules scattered over all segments, spinules largest on ventral surfaces; pubescence on cutting edges of fingers, more prominent on fixed finger, **palm pubescent on ventral surface**, distal part of carpus slightly pubescent on ventral surface; fingers slender, slightly gaping, 0.6 to 0.8 times as long as palm, dactylus with large triangular tooth at middle of cutting edge and 2 to 4 smaller teeth in proximal half; fixed finger with large triangular tooth at about proximal third of cutting edge with an additional 1 or 2 smaller teeth in proximal third; palm compressed, about 3 times as long as high; carpus short, widening slightly distally, about half as long as palm; **merus cylindrical, slightly longer than carpus**, ischium short, about half palm length. Telson with distal end rounded, **2 pairs of terminal spines not extending beyond distal end**, series of many plumose setae along distal margin between inner pair of terminal spines. **Colour:** body evenly light brown to beige coloured. Carapace with dark longitudinal mediolateral line on both sides; with dark brown or green diffuse spots at base of rostrum (small) and near posterior margin (large); rostrum with dorsal lamina translucent, ventral lamina dark in colour, usually bluish or greyish. Chela of second legs in males with distinct dark blue fingers, base of fingers orange to yellow.

**Size:** Maximum total length 18.2 cm.

**Habitat, biology, and fisheries:** Occurring in fresh, brackish and sometimes salt water. Commercially important, especially in aquaculture. Fishery for this species takes place in Senegal, French Guinea, Côte d'Ivoire, Gabon, Congo (Democratic Republic of the) and Liberia. The large size and excellent taste, makes it desirable throughout its range. This species does not seem to occur in large quantities, thus the fishery is of a local nature. Experimental culture has been started in Ghana.

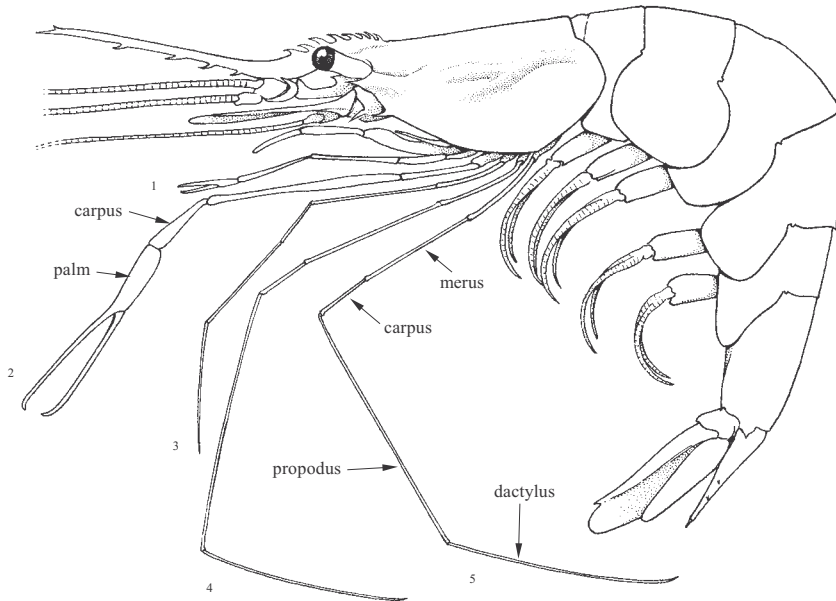
**Distribution:** Eastern Atlantic: West Africa from the Cape Verde Islands and Senegal to south Angola.



***Nematopalaemon hastatus* (Aurivillius, 1898)**

**Frequent synonyms / misidentifications:** *Palaemon* (*Nematopalaemon*) *hastatus* Aurivillius, 1898 / None.

**FAO names:** **En** – West African estuarine prawn; **Fr** – Bouquet étier; **Sp** – Camarón estuarino africano.



**Diagnostic characters:** Carapace smooth, with antennal and branchiostegal spines, without hepatic spine. Rostrum styliform bearing dorsally a group of 7 to 11 teeth on the basal crest, and 1 isolated tooth near the tip; its ventral margin armed with 3 to 11 teeth with single row of setae between ventral teeth. Second legs slender; fingers of chela slender, almost twice as long as palm; carpus about as long as palm; merus more than twice as long as carpus. Third, fourth and fifth legs very slender; dactylus exceptionally long and slender, almost as long as propodus; fourth and fifth legs distinctly longer than third. Telson with a truncate tip bearing 2 large, movable spines, its lateral margins with 2 pairs of small spines. No appendix interna on first pleopods. **Colour:** whitish.

**Size:** Maximum total length: 7.5 cm.

**Habitat, biology, and fisheries:** Found on sandy and muddy bottoms in estuarine as well as coastal marine waters to depths of about 50 m. Occurs mainly in estuarine and coastal waters of Nigeria. Separate statistics are not reported for this species. Caught with seines (up to 500 kg per haul). Sold dried, salted and smoked in local markets.

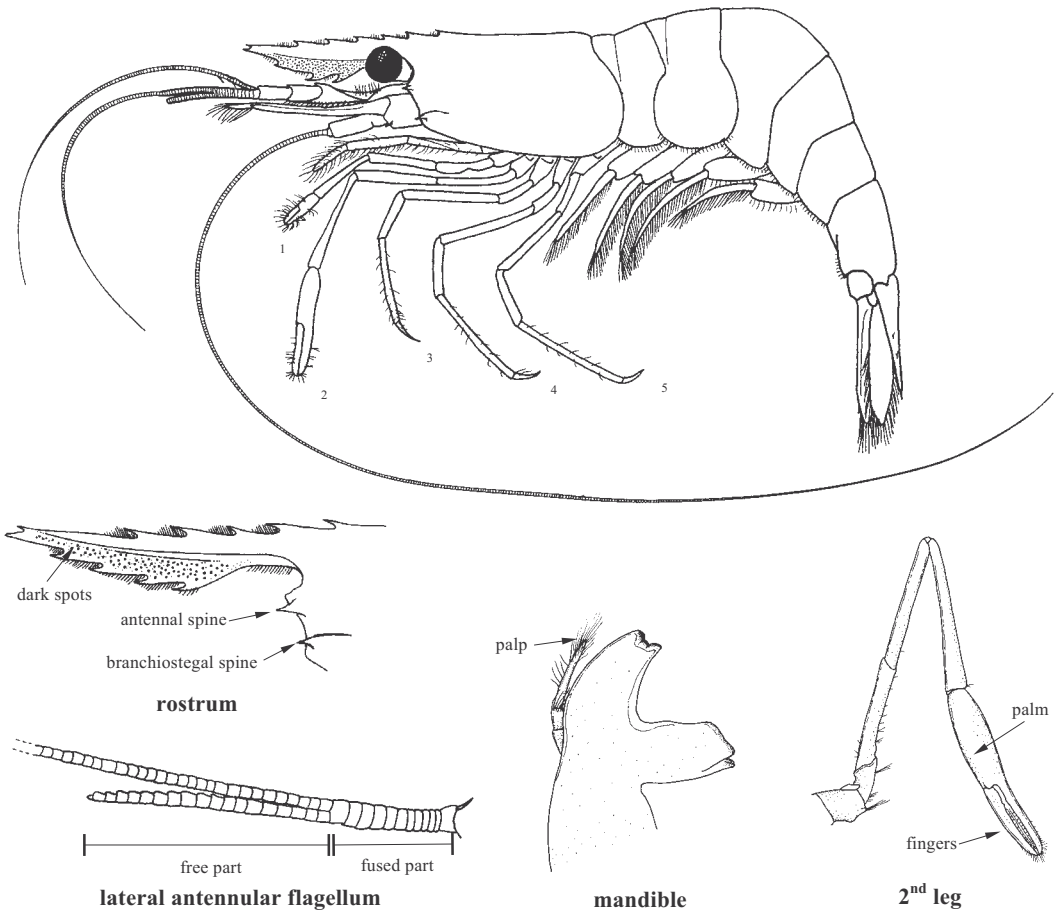
**Distribution:** Eastern Atlantic: Senegal to Angola.



***Palaemon adpersus* Rathke, 1837**

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

**FAO names:** En – Baltic prawn; Fr – Bouquet balte; Sp – Camarón báltico.



**Diagnostic characters:** Species of small to moderate size. Rostrum extending beyond tip of scaphocerite; straight, with 6 or 7 (rarely 5 or 8) regularly spaced dorsal teeth of which only 1 is positioned behind the orbit; 3 ventral teeth (rarely 2, 4, or 5); tip often bifid. Antennal and branchiostegal spines marginal. Antennules triramous; shorter ramus of outer antennular flagellum normally exceeding length of peduncle and fused for third of its length to longer ramus. Third maxilliped about half the length of scaphocerite; exopod present. **Mandible with 3-segmented palp.** Fingers of second legs slightly shorter than palm; **carpus about 1.2 times length of merus.** Telson with 2 pairs of lateral spines. **Colour:** uniformly transparent with scattered dark spots over body, without distinct lines and bands; legs transparent with yellow at joints; characteristic for this species, compared to the other species in the area, are the **many dark spots on the ventral part of the rostrum**; eggs dark brown to black.

**Size:** Maximum total length 8 cm, commonly between 3 and 6 cm.

**Habitat, biology, and fisheries:** Occurring in coastal waters at depths to 10 m, seldom deeper. Living on muddy bottoms with algae and seagrasses in brackish or salt water. Females are ovigerous in August (Spain). Commercially important along the Atlantic coast of Europe and in the Mediterranean. On the Atlantic coast of Morocco (near Mehdiya) the species is caught and used as food.

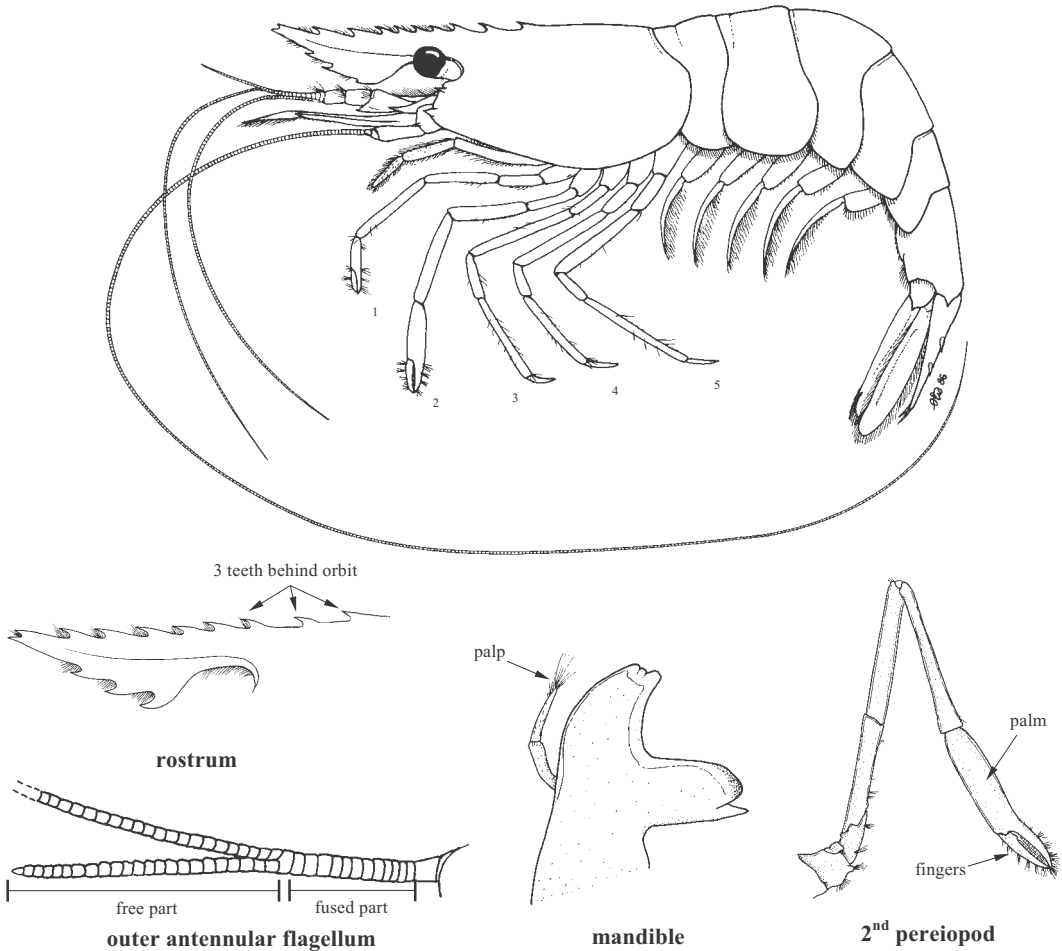
**Distribution:** Eastern Atlantic: Baltic from southwest Finland and Sweden south to Poland, Germany and Denmark; southern Norway and British Islands south to the Atlantic coasts of France, Spain, Portugal and Morocco; Mediterranean; Black and Caspian Seas.



***Palaemon elegans* Rathke, 1837**

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

**FAO names:** En – Rockpool prawn; Fr – Bouquet flaque; Sp – Camarón de poza.



**Diagnostic characters:** Species of small to moderate size. **Rostrum straight or slightly upcurved, just reaching beyond the scaphocerite; 7 to 9 regularly spaced, dorsal teeth, tip often bifid, 3 (rarely 2) teeth situated behind the orbit; 3 ventral teeth (rarely 2 or 4).** Carapace with antennal and branchiostegal spines marginal. Antennules triramous; shorter ramus of outer flagellum stout, about equal in length to peduncle and **fused for about two-fifth of its length to longer ramus.** Scaphocerite extends to proximal half of propodus of second pereopod (maximum); distolateral tooth not exceeding lamellar portion. Third maxilliped about half the length of scaphocerite; exopod present. **Mandible with 2-segmented palp.** Fingers of chela of second legs not more than half length of palm; carpus slightly longer than merus. Telson with 2 pairs of lateral spines. **Colour:** carapace and abdomen with dark yellow-brown bands. Rostrum colourless or with small red spots. Legs with yellow and blue bands.

**Size:** Maximum total length about 6 cm, commonly 3 to 5 cm.

**Habitat, biology, and fisheries:** Usually inhabiting rock pools and the shallow sublittoral zone (0 to 10 m). Marine. Of commercial interest along the Atlantic coast of Europe and in the Mediterranean. Of potential importance in Fishing Areas 34 and 47. Marketed fresh and used as bait.

**Distribution:** Eastern Atlantic: from western Norway, western Sweden, Denmark and the British Islands (including the North Sea) south to southwest Africa; Mediterranean; Black Sea; Caspian Sea.

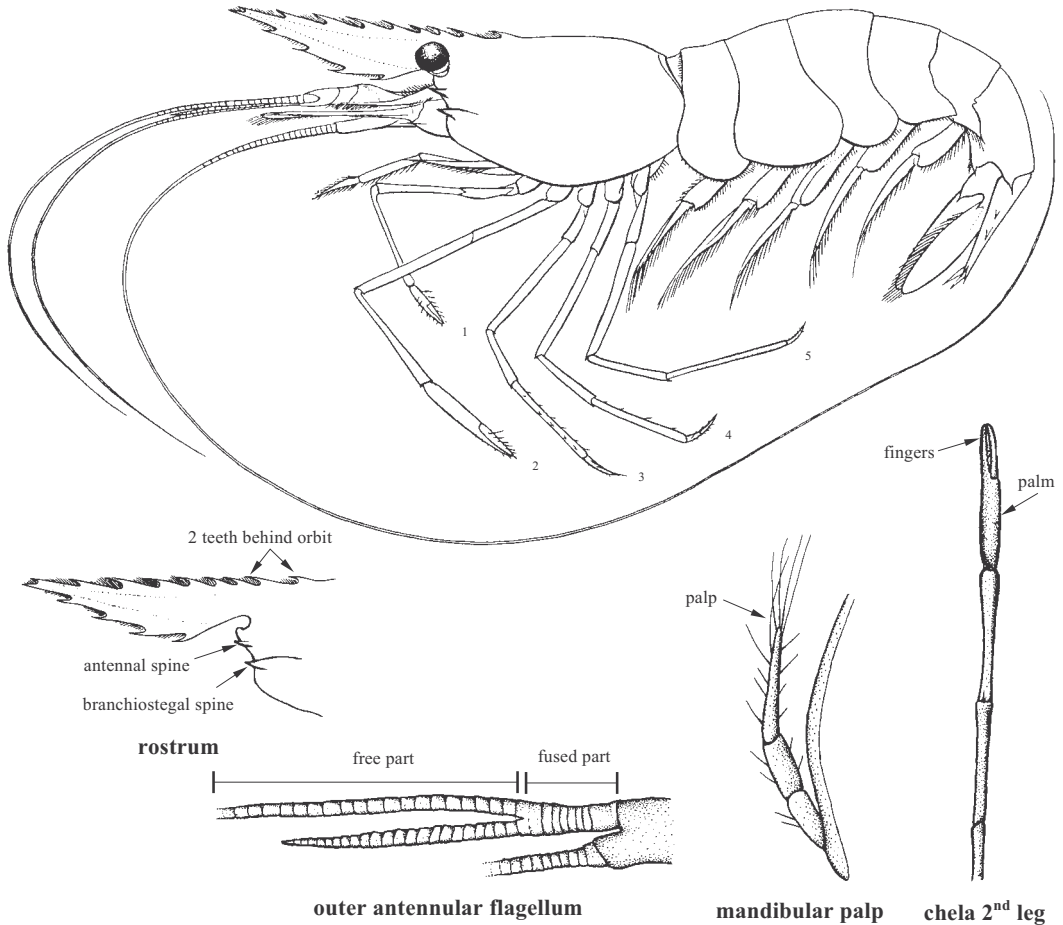




***Palaemon longirostris*** H. Milne Edwards, 1837

**Frequent synonyms / misidentifications:** *Palaemon garciacidi* Zariquiey Alvares, 1968 / None.

**FAO names:** En – Delta prawn; Fr – Bouquet delta; Sp – Camarón delta.



**Diagnostic characters:** Rostrum straight or slightly upcurved, projecting just beyond tip of scaphocerite; tip occasionally bifid; 8 to 10 regularly spaced dorsal teeth of which 2 are positioned behind posterior edge of orbit, second tooth from posterior about 1.5 times more distant from first than from next distally; 3 to 6 (usually 3 or 4) ventral teeth. Carapace with marginal antennal and branchiostegal spines. Antennules triramous; shorter ramus of outer antennular flagellum about 0.66 times length of peduncle and fused for less than third of length to longer ramus. Scaphocerite extends to distal half of carpus of second legs, occasionally little further; apical spine not exceeding lamellar portion. Third maxilliped with exopod. **Mandible with 3-segmented palp.** Fingers of second legs usually slightly shorter than palm; dactylus and carpus slender; **carpus equal to or slightly longer than merus.** Telson with 2 pairs of lateral spines. **Colour:** body translucent covered with chromatophores but without dark lines; named "White Prawn" because of its white appearance after boiling.

**Size:** Maximum total length 7 cm, commonly between 3 and 7 cm.

**Habitat, biology, and fisheries:** Occurring in brackish waters of estuaries. Interest to fisheries is minor along the Atlantic coast of Europe.

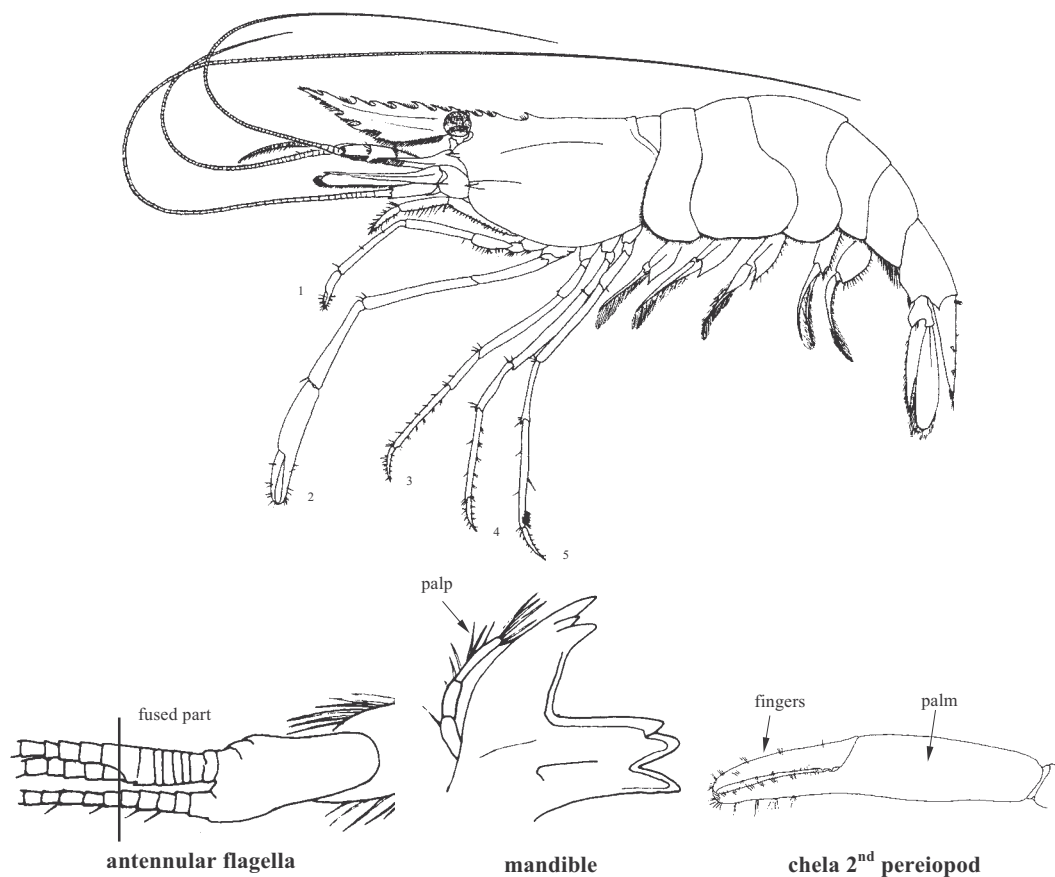
**Distribution:** Eastern Atlantic: northwest Germany, British Isles and the Netherlands south to France, Spain, Portugal and the Atlantic coast of Morocco. Its occurrence in the Mediterranean is doubtful.



***Palaemon macrodactylus* Rathbun, 1902**

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

**FAO names:** En – Migrant prawn; Fr – Bouquet migrateur; Sp – Camarón emigrante.



**Diagnostic characters:** Rostrum straight or slightly upcurved, projecting beyond tip of scaphocerite; 9 to 15 (usually 10 to 12) regularly spaced dorsal rostral teeth (subdistal teeth excluded), of which 3 (seldom 4) are positioned behind posterior edge of orbit; with 3 to 5 (usually 4) ventral teeth. Rostrum strongly setose between rostral teeth. Carapace with marginal antennal and submarginal branchiostegal spines. Antennules triramous; shorter ramus of outer antennular flagellum fused for a quarter of its length to longer ramus. Scaphocerite extends to carpus of second legs; distolateral tooth not exceeding lamina. **Mandible with 3-segmented palp.** Third maxilliped with exopod. Fingers of second legs usually slightly shorter than palm; dactylus and carpus slender, palm broad; **carpus equal to length of merus.** Telson with 2 pairs of lateral spines. **Colour:** reddish to brownish or greenish to bluish green. Whitish longitudinal stripe all over body. Carapace with weakly developed pattern of oblique stripes on finely dotted background. Antennular peduncle with many large dot-like dark chromatophores. Legs brownish to reddish (sometimes translucent light bluish) with a tinge of orange at articulations and a small indistinct brownish band above them. Eggs brown.

**Size:** Maximum total length 7.3 cm, usually between 4 and 6 cm.

**Habitat, biology, and fisheries:** Estuarine, occurring in brackish water. Commercially important in north China, Korea and Japan. In San Francisco, California, it turned up in commercial shrimp catches. It is expected that this species will spread along the east Atlantic coast of Europe and North Africa. It is of potential importance in Fishing Areas 34 and 47.

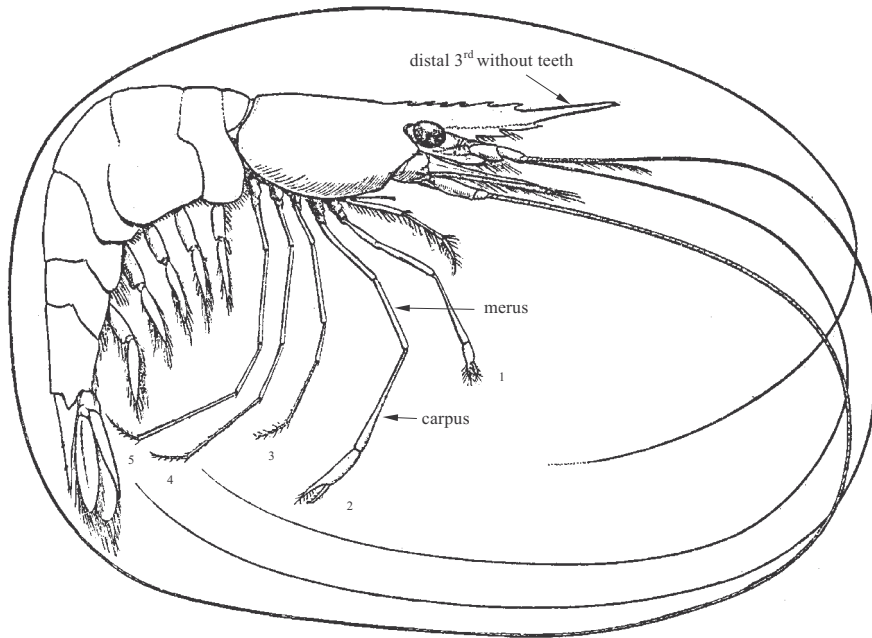
**Distribution:** Originally Indo-West Pacific. Introduced in the eastern Pacific (San Francisco Bay area), Australia (Northern Territories and New South Wales) and recently in the east Atlantic (Orwell Estuary, Suffolk, eastern England; northern France; Belgium; the Netherlands; Cadiz, Spain; northern Morocco).



***Palaemon maculatus*** (Thallwitz, 1892)

**Frequent synonyms / misidentifications:** *Leander maculatus* Thallwitz, 1892 / *Palaemon edwardsii* Rathbun, 1900.

**FAO names:** En – Zaire prawn; Fr – Bouquet Zaire; Sp – Camarón zairense.



**Diagnostic characters:** Rostrum elongated, straight at tip in adults, with 7 or 8 teeth in proximal portion, one of which is situated with some distance behind the orbit; distal third of rostral dorsal margin without teeth except for subdistal tooth; ventral margin of rostrum with 3 teeth. Antennules triramous; shorter ramus of outer antennular flagellum fused with 12 or 13 segments to longer ramus; shorter free ramus of flagellum as long as fused part. **Mandibular palp with 2 articles. Carpus of second pair of legs longer than merus** and chela; the propodus/carpus joint reaching beyond anterior margin of antennular scale (scaphocerite). **Colour:** a dark spot at the base of the rostrum. Further information lacking.

**Size:** Maximum total length 4.3 cm.

**Habitat, biology, and fisheries:** Occurring in shallow coastal, brackish water. Of local importance to fisheries off the coast near the mouth of the Congo River.

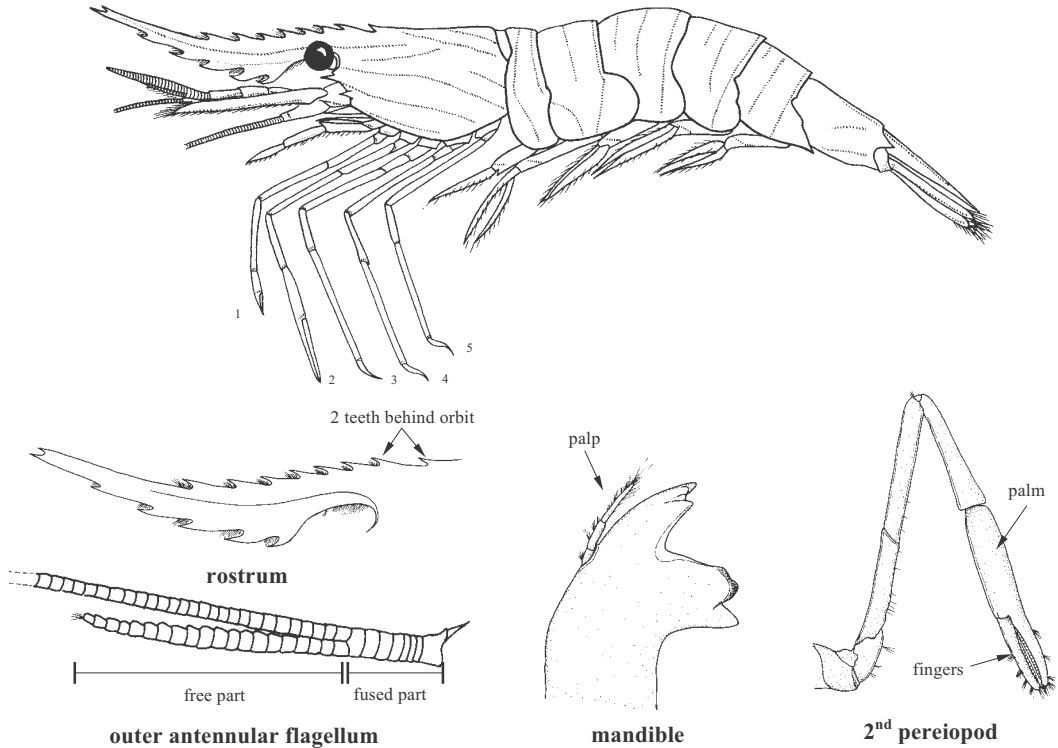
**Distribution:** Eastern Atlantic: West Africa from Senegal to Angola.



***Palaemon serratus* (Pennant, 1777)**

**Frequent synonyms / misidentifications:** *Leander serratus* (Pennant, 1777) / None.

**FAO names:** En – Common prawn; Fr – Bouquet commun; Sp – Camarón común.



**Diagnostic characters:** Rostrum elongated, often bent upward at tip in adults, anterior third of upper margin smooth, followed posteriorly by 7 to 11 teeth of which 2 posterior to orbit; ventral margin of rostrum with 4 to 6 teeth. Antennules triramous; shorter ramus of outer antennular flagellum fused for 8 articles, a third of its length, to longer ramus. Mandibular palp usually of 3 articles. Carpus of second pair of legs shorter than merus and pincer; propodus/carpus joint not reaching anterior margin of scaphocerite. **Colour:** pale pink, the carapace ornamented with longitudinal or oblique dark lines; eyestalks, antennules, pereiopods and telson with red blotches.

**Size:** Maximum total length: 11 cm, commonly between 5 and 8 cm.

**Habitat, biology, and fisheries:** Inhabits rocky as well as muddy bottoms in shallow waters to depths of about 40 m. Spawning occurs from mid-November to the beginning of summer; most females spawn twice, each spawn comprising 1 500 to 4 500 eggs, depending on size of female. The lifespan of the species is believed to be 5 or 6 years. Omnivorous, feeding on seaweeds and small crustaceans. Littoral areas along the Moroccan coast. Caught mainly with traps; also with bottom trawls. Marketed fresh.

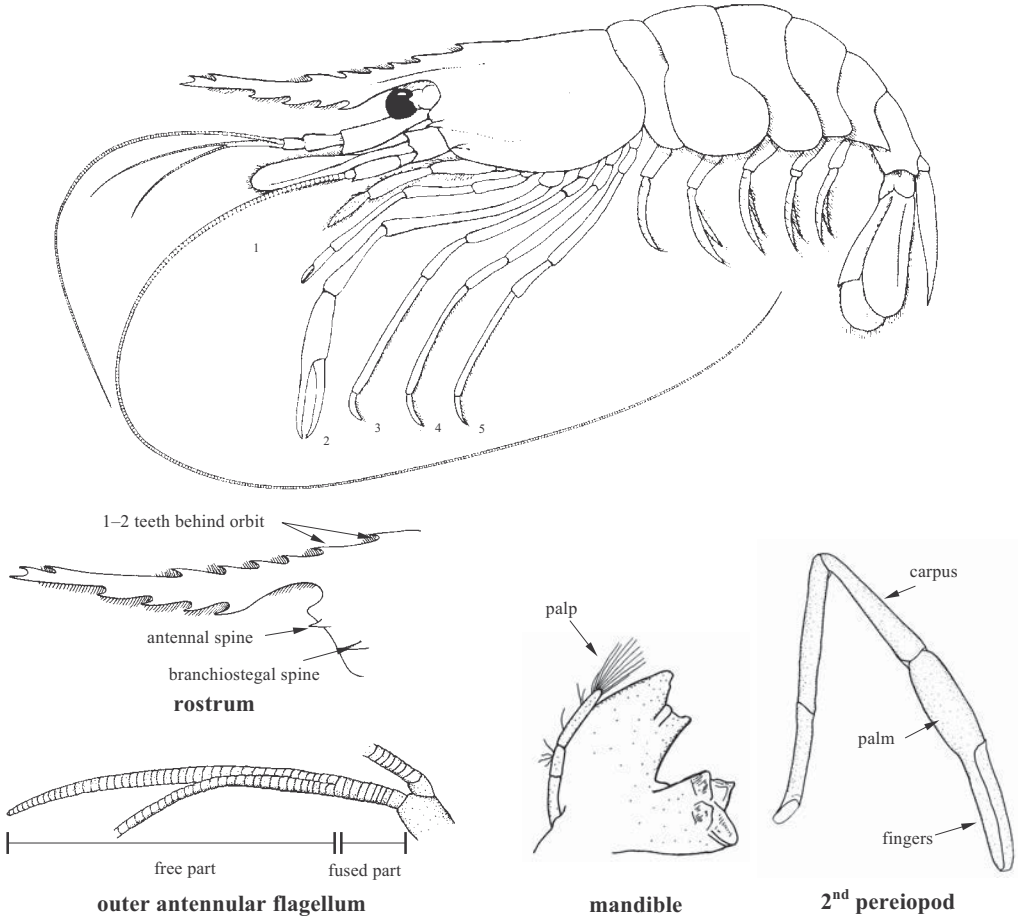
**Distribution:** Eastern Atlantic: Morocco to Mauritania; northward along the coasts of Europe to Denmark; Mediterranean.



***Palaemon xiphias* Risso, 1816**

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

**FAO names:** En – Posidonia prawn; Fr – Bouquet posidonie; Sp – Camarón posidonia.



**Diagnostic characters:** Shrimp of small to moderate size. **Rostrum long and slender, sometimes slightly upcurved, projecting beyond tip of scaphocerite; 7 or 8 dorsal teeth of which 1 or 2 are positioned behind posterior edge of orbit, second tooth from posterior distinctly more distant from first than from third, distalmost 2 teeth separated from proximal series by toothless region; 4 or 5 ventral teeth.** Carapace with marginal antennal and submarginal branchiostegal spines. Antennules tiramous; **shorter ramus of outer antennular flagellum fused for less than fifth of length to longer ramus.** Scaphocerite just overreaching carpus of second legs; distolateral spine not exceeding lamina. Third maxilliped with exopod. **Mandible with 3-segmented palp.** Fingers of second legs slender, slightly longer than somewhat swollen palm; **carpus equal to or slightly shorter than merus.** Telson with 2 pairs of lateral spines. **Colour:** uniformly green or green-brown, without stripes or dots.

**Size:** Maximum total length 6.5 cm, commonly between 3 and 6 cm.

**Habitat, biology, and fisheries:** Occurring in shallow water with vegetated bottom. Marine. Of potential importance in the area. It is regarded economically important in parts of the Mediterranean Sea.

**Distribution:** Eastern Atlantic: Madeira; Canary Islands; Mediterranean. Absent in the Black Sea, its presence in the southeastern Mediterranean needs confirmation.

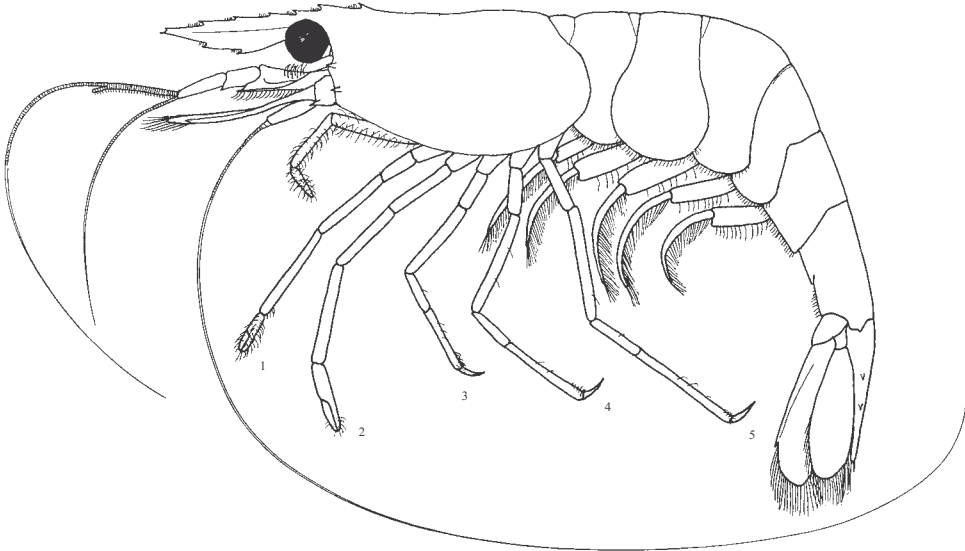




***Palaemonetes varians*** (Leach, 1814)

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

**FAO names:** **En** – Atlantic ditch shrimp; **Fr** – Bouquet atlantique des canaux; **Sp** – Camarón de acequia atlántico.



**Diagnostic characters:** Small sized shrimp. Rostrum straight, apex occasionally bifid; 4 to 6 dorsal teeth (rarely 1 to 3, 7 or 8), 2 ventral teeth (rarely none, 1, 3 or 4); 1 dorsal tooth postorbital. **Carapace with antennal and branchiostegal spines.** Antennules triramous; **shorter ramus of outer flagellum about 0.8 times length of peduncle and fused for about 0.75 of its length to longer ramus.** Outer edge of stylocerite slightly convex, anterior border straight, apical spine short and stout. Scaphocerite reaching proximal half of propodus of second leg (or to 0.5 length of dactylus in juveniles), apical spine not exceeding lamellar portion. Third maxilliped extending just beyond midpoint of scaphocerite; exopod present. **Mandible with incisor and molar process, but without palp.** Dactylus of second leg slightly over 0.33 times length of propodus; **carpus longer than chela**, about 1.2 times length of merus, but occasionally up to 1.7 times merus length. Telson with 2 pairs of lateral spines. First pleopod without appendix interna. **Colour:** completely translucent, sometimes somewhat green-brown, without stripes; pereiopods translucent with yellow at joints; white or yellow chromatophores scattered on carapace, margins of abdominal pleura and ventral margin of rostrum.

**Size:** Maximum total length 5 cm, commonly around 2.7 cm.

**Habitat, biology, and fisheries:** Occurring in brackish water. Of no interest to fisheries in the area. Of minor importance along the European Atlantic coast where it is sometimes taken as food and sometimes used as bait.

**Distribution:** Eastern Atlantic: west Baltic and North Sea to the Atlantic coast of Morocco; Mediterranean coast of Algeria.

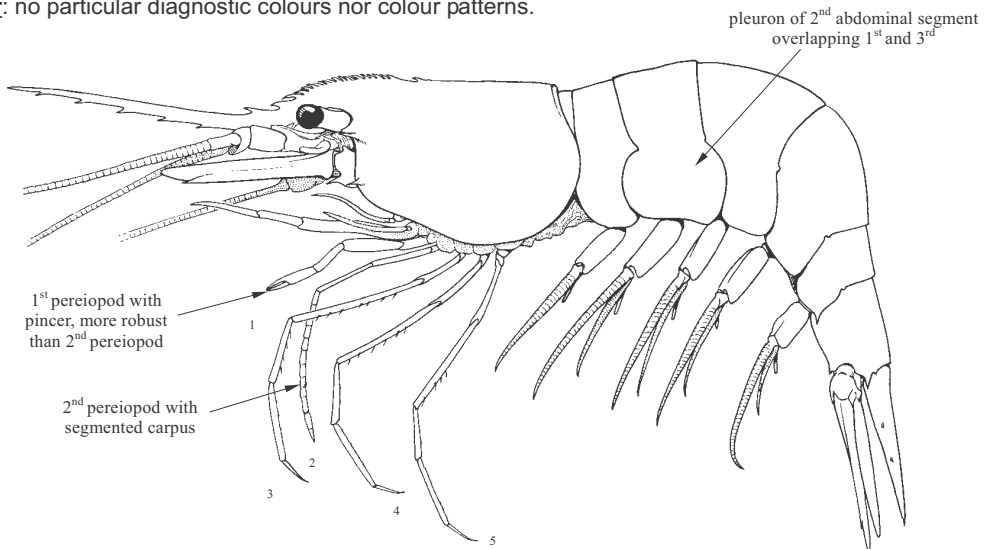


## Superfamily ALPHEOIDEA

### HIPPOLYTIDAE

#### Cock shrimps

**Diagnostic characters:** As in the other families belonging to the Infraorder Caridea, the pleura of the second abdominal segment overlap those of the first and third segments, and the third pair of pereiopods lacks pincers. Rostrum well developed, laterally compressed, usually denticulate, seldom extending beyond scaphocerite. Carapace without subocular tooth posterodorsal to orbital angle. **First pair of pereiopods symmetrical, ending in clearly distinct pincers, broader than second pair, but not considerably enlarged. Second pair of pereiopods with carpus segmented, pincers small.**  
**Colour:** no particular diagnostic colours nor colour patterns.

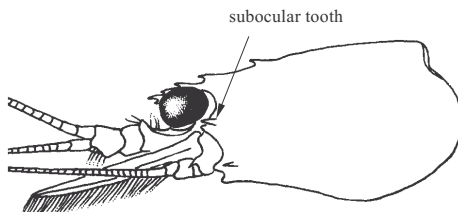


**Habitat, biology, and fisheries:** This family includes many fairly small marine representatives; only *Exhippolysmata hastatoides* and *Lysmata seticaudata* are of some interest to fisheries in the area.

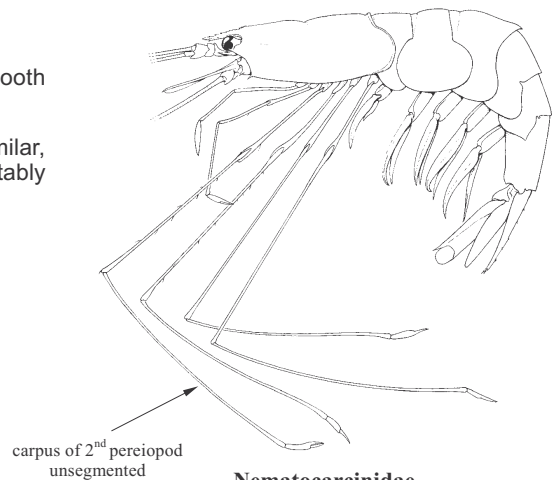
#### Similar families occurring in the area

**Barbouriidae:** carapace armed with subocular tooth posterodorsal to orbital angle.

**Nematocarcinidae:** first 2 pairs of pereiopods similar, their carpus unsegmented, the following pairs notably elongate.



**Barbouriidae**

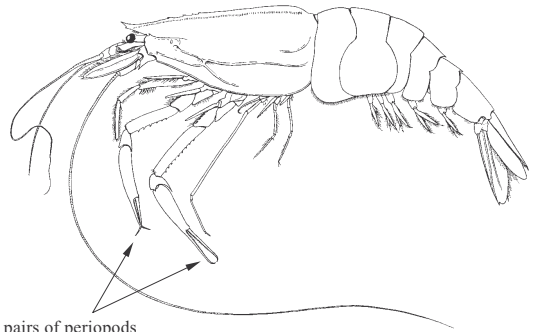


**Nematocarcinidae**

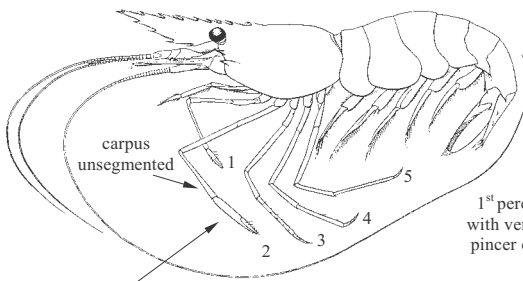
**Pasiphaeidae:** body strongly compressed; rostrum short; pereiopods of first 2 pairs much larger and stronger than those of following pairs.

**Palaemonidae:** first pair of pereiopods with small pincers; second pair much better developed and bearing strong pincers, their carpus unsegmented.

**Pandalidae:** first pair of pereiopods with very small or no pincers; carpus in second pair segmented.

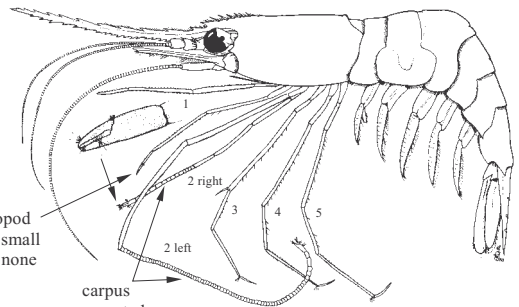


**Pasiphaeidae**



2<sup>nd</sup> pair of pereiopods with strong pincers

**Palaemonidae**



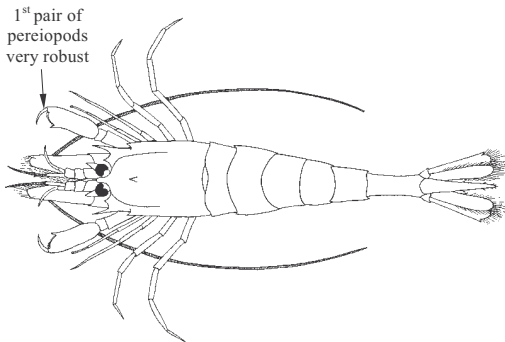
1<sup>st</sup> pereiopod with very small pincer or none

carpus segmented

**Pandalidae**

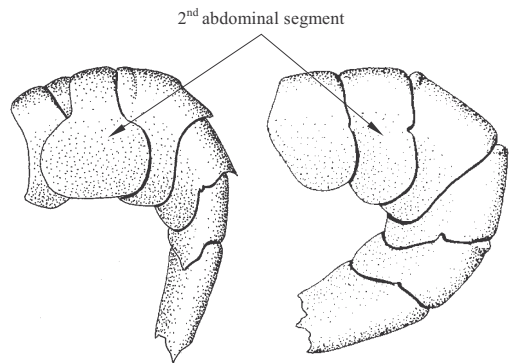
**Crangonidae:** first pair of pereiopods very robust with incomplete pincers lacking the fixed finger; body depressed.

**Penaeidean shrimps:** pleura of second abdominal segment not overlapping those of first segment; the 3 first pairs of pereiopods ending in pincers.



1<sup>st</sup> pair of pereiopods very robust

**Crangonidae**



2<sup>nd</sup> abdominal segment

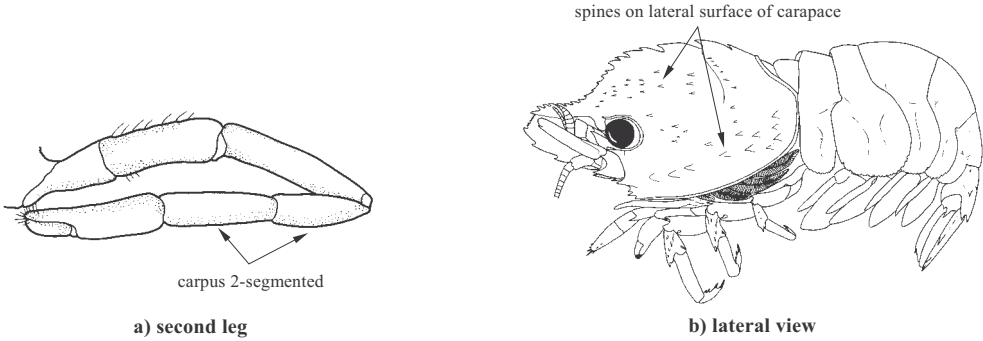
**Caridea**

abdomen

**Penaeidae**

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

- 1a. Carpus of second leg with 3 or more segments; lateral surface of carapace without many small spines . . . . . → 2
- 1b. Carpus of second leg 2-segmented (Fig. 1 a); lateral surface of carapace with many small spines (Fig. 1b) . . . . . **Trachycaris**



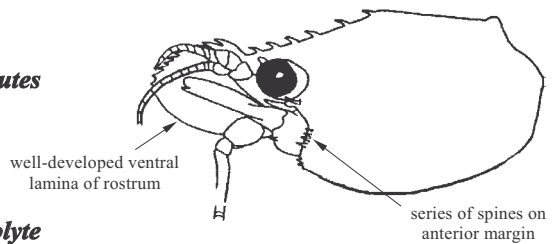
**Fig. 1 *Trachycaris restricta***

- 2a. Carapace with supraorbital spine (Fig. 2a) . . . . . → 3
- 2b. Carapace without supraorbital spine . . . . . → 6
- 3a. Carpus of second leg 3-segmented (Fig. 2b) . . . . . → 4
- 3b. Carpus of second leg with 6 or more articles . . . . . → 5



**Fig. 2 *Hippolyte inermis***

- 4a. Rostrum with well-developed ventral lamina; series of 5 to 9 small spines at the anterior margin of the carapace (Fig. 3) . . . **Latreutes**
- 4b. Rostrum not ventrally developed, but might be somewhat developed proximally; anterior margin of carapace without series of spines . . . . . **Hippolyte**



**Fig. 3 *Latreutes parvulus***

- 5a. Carapace with branchiostegal spine, without pterygostomial spine (Fig. 4); rostrum without ventral teeth . . . . . ***Bythocaris***
- 5b. Carapace without branchiostegal spine, with pterygostomial spine (Fig. 5); rostrum with ventral teeth . . . . . ***Lebbeus***

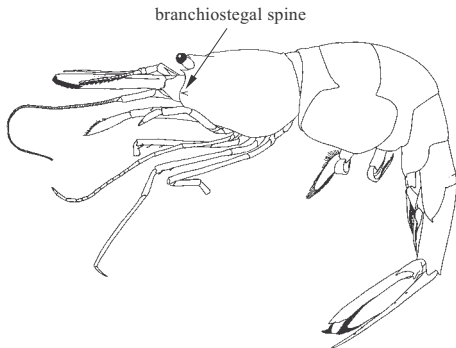


Fig. 4 *Bythocaris akidopleura*

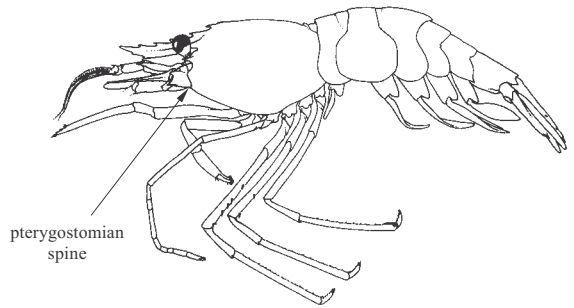


Fig. 5 *Lebbeus africanus*

- 6a. Rostrum long, extending beyond antennular peduncle and scaphocerite . . . . . → 7
- 6b. Rostrum short, not extending beyond scaphocerite . . . . . → 8
- 7a. Carapace without pterygostomial spine; dorsal margin of rostrum with 4 widely spaced teeth (Fig. 6) . . . . . ***Merhippolyte***
- 7b. Carapace with pterygostomial spine; dorsal margin of rostrum with 18 to 20 closely set teeth (Fig. 7) . . . . . ***Exhippolyasmata***

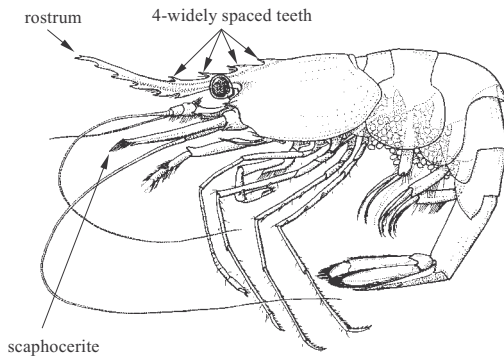


Fig. 6 *Merhippolyte ancistrotata*

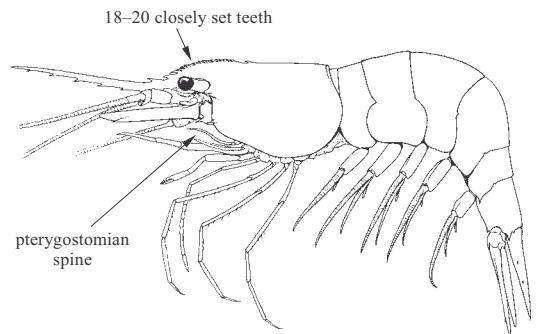


Fig. 7 *Exhippolyasmata hastatoides*

- 8a. Carpus of second pereiopod with 6 or 7 articles . . . . . → 9
- 8b. Carpus of second pereiopod with more than 10 articles . . . . . → 11

9a. Movable plate present at the distal segment of the antennular peduncle (Fig. 8); no epipods on any pereopod . . . . . ***Thor***

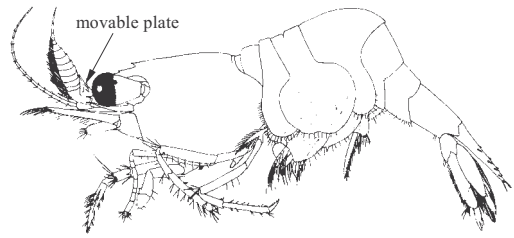


Fig. 8 *Thor*

9b. No movable plate present on the distal segment of the antennular peduncle; epipods on at least the bases of the first two pereopods (Fig. 9) . . . . . ***Eualus***

10a. Rostrum reaching distal margin of scaphocerite; branchiostegal spine present, pterygostomial spine absent (Fig. 10) . . . . . ***Ligur***

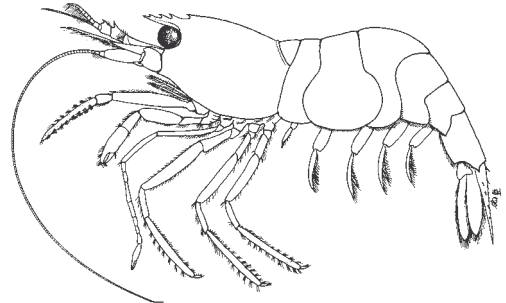


Fig. 9 *Eualus occultus*

10b. Rostrum not overreaching distal margin of antennular peduncle; branchiostegal spine absent, pterygostomial spine present (Fig. 11). . . . . ***Lysmata***

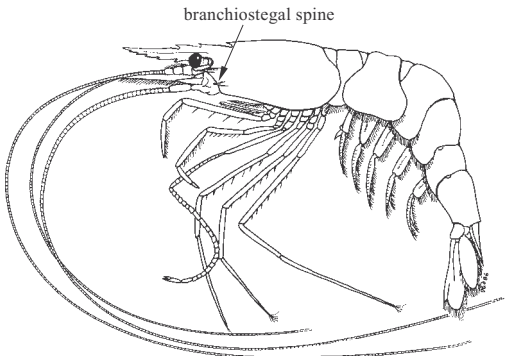


Fig. 10 *Ligur ensiferus*

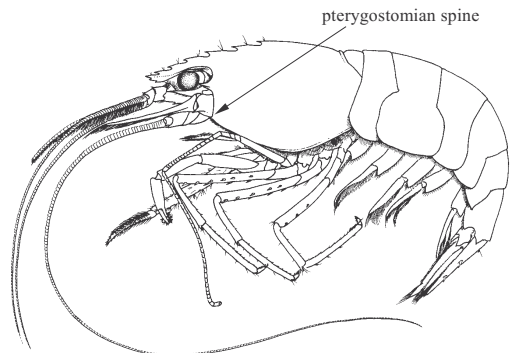



Fig. 11 *Lysmata seticaudata*

**List of species occurring in the area**

The symbol  is given when species accounts are included.

- Bythocaris akidopleura* Fransen, 1993.
- Bythocaris cosmetops* Holthuis, 1951.
- Eualus cranchii* (Leach, 1817).
- Eualus gracilipes* Crosnier and Forest, 1973.
- Eualus lebourae* Holthuis, 1951.
- Eualus occultus* (Lebour, 1936).

 *Exhippolysmata hastatoides* (Balss, 1914).

- Hippolyte coerulescens* (Fabricius, 1775).  
*Hippolyte garciaraso* d'Udekem d'Acoz, 1996.  
*Hippolyte inermis* Leach, 1816.  
*Hippolyte lagarderei* d'Udekem d'Acoz, 1995.  
*Hippolyte leptocerus* (Heller, 1863).  
*Hippolyte palliola* Kensley, 1970.  
*Hippolyte prideauxiana* Leach, 1817.  
*Hippolyte varians* Leach, 1814.  
*Latreutes fucorum* (Fabricius, 1798).  
*Latreutes parvulus* (Stimpson, 1871).  
*Lebbeus africanus* Fransen, 1997.  
*Ligur ensiferus* (Risso, 1816).  
*Lysmata grabhami* (Gordon, 1953).  
*Lysmata intermedia* (Kingsley, 1878).  
*Lysmata nilita* Dohrn and Holthuis, 1950.  
*Lysmata olavo* Fransen, 1991.  
 *Lysmata seticaudata* (Risso, 1816).  
*Lysmata stenolepis* Crosnier and Forest, 1973.  
*Lysmata uncicornis* Holthuis and Maurin, 1952.  
*Merhippolyte agulhasensis* Bate, 1888.  
*Merhippolyte ancistrota* Crosnier and Forest, 1973.  
*Thor amboinensis* (de Man, 1888).  
*Trachycaris restricta* (Milne Edwards, 1878).

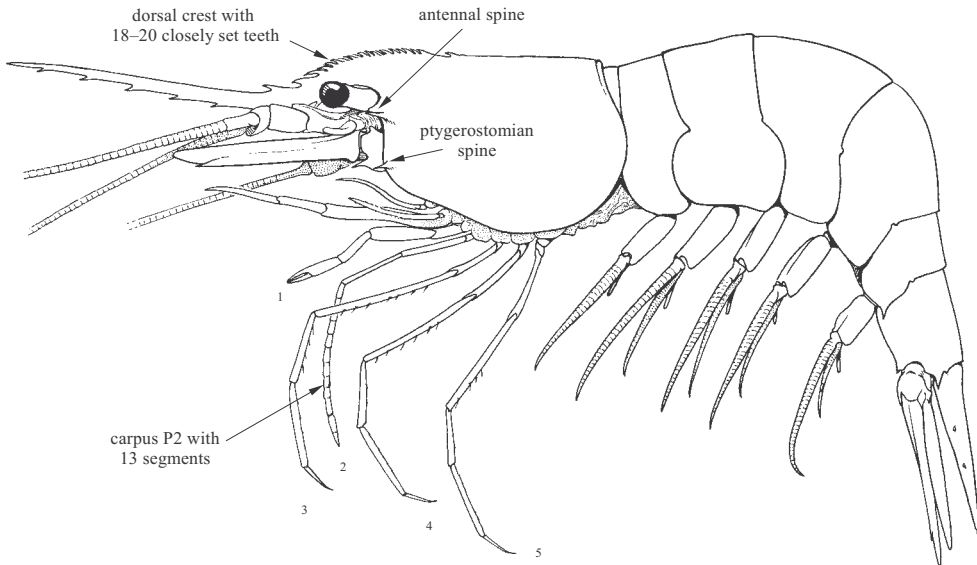
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- De Grave, S., Pentcheff, N.D., Ah Yong, S.T., Chan, T.-Y., Crandall, K.A., Dworschak, P.C., Felder, D.L., Feldmann, R.M., Fransen, C.H.J.M., Goulding, L.Y.D., Lemaitre, R., Low, M.E.Y., Martin, J.W., Ng, P.K.L., Schweitzer, C.E., Tan, S.H., Tshudy, D. & Wetzer, R.** 2009. A classification of living and fossil genera of decapod crustaceans. *The Raffles Bulletin of Zoology*, Suppl. 21: 1–109.
- d'Udekem d'Acoz, C.** 1999. *Inventaire et distribution des crustacés décapodes de l'Atlantique nord-oriental, de la Méditerranée et des eaux continentales adjacentes au nord de 25°N*. Muséum National d'Histoire Naturelle, Paris, I–X, 1–383.
- Holthuis, L.B.** 1993. *The recent genera of Caridean and Stenopodidean shrimps (Crustacea, Decapoda): with an appendix on the order Amphionidacea*. Nationaal Natuurhistorisch Museum, Leiden, 1–328.

***Exhippolysmata hastatoides* (Balss, 1914)**

**Frequent synonyms / misidentifications:** *Hippolysmata hastatoides* (Balss, 1914) / None.

**FAO names:** **En** – Companion shrimp; **Fr** – Bouc compagnon; **Sp** – Camarón compañoero.



**Diagnostic characters:** Rostrum styliform, with a **dorsal crest bearing 18 to 20 teeth increasing in size from back to front**; the crest is followed by an isolated spine located just in front of a small tubercle; ventral margin of rostrum armed with 7 or 8 teeth. **Carapace with antennal and pterygostomial spines, without branchiostegal and supraorbital spines. Second pair of pereiopods slender, their carpus divided into 13 segments**, the following pairs with movable spines on the merus and a **short dactylus**. Telson ending in a pointed tip flanked by a movable spine on either side, its lateral margins with long hair and 2 pairs of movable spines. **Colour:** whitish.

**Size:** Maximum total length: about 7 cm.

**Habitat, biology, and fisheries:** Inhabits coastal and estuarine waters, to about 15 m depth on sand and mud bottoms. Coastal and estuarine areas. Separate statistics are not reported for this species, but catches are doubtless very small, the species being only of limited local interest; in Nigeria it is reported to be caught in somewhat larger quantities (several hundred tonnes annually) combined with *Nematopalaemon hastatus*. Caught mainly with beach seines. Marketed fresh and smoked.

**Distribution:** West African coast from Sierra Leone to Angola.

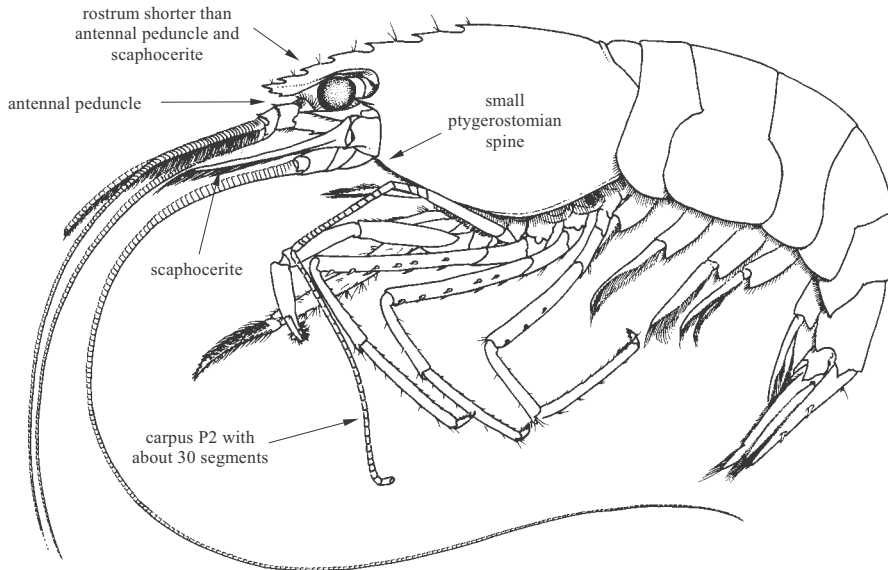




***Lyсмata seticaudata* (Risso, 1816)**

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

**FAO Names:** **En** – Monaco shrimp; **Fr** – Bouc monégasque; **Sp** – Camarón monagués.



**Diagnostic characters:** Shrimp of moderate size. Rostrum straight, curved up at tip, rather short, not reaching end of antennular peduncle; with 5 to 7 dorsal and 2 ventral teeth; 3 (seldom 2) dorsal teeth situated behind the orbit. **Carapace with large antennal and small pterygostomial spines, without supraorbital and branchiostegal spines.** Stylocerite long and pointed, reaching beyond end of basal antennular segment. Antennal scale (scaphocerite) almost twice as long as antennular peduncle, outer margin slightly concave, apical spine overreaching larger part of last segment. First pair of pereopods slender, equal in size and form, chela with **black fingers**; fingers much shorter than palm. **Second pair of pereopods much longer and more slender than first, distal part of ischium, merus and carpus divided in segments; carpus subdivided in many small segments (about 30).** Telson with 2 pairs of dorsal spines, fringe of hairs along lateral margin of telson. **Colour:** body with straight, red, longitudinal bands, separated by pale bands of similar width; pereopods and other appendages reddish.

**Size:** Maximum total length 6.7 cm, usuall between 3 and 4 cm.

**Habitat, biology, and fisheries:** Occurring in depths between 4 to 60 m. Demersal, among vegetation. The interest to fisheries is minor. The species is known to be very good to eat but is not abundant. It is sometimes sold in small quantities at fish markets in Italy and Tunisia.

**Distribution:** Eastern Atlantic: West coast of Europe from the Channel Islands south to southern Spain and northern Morocco and the Canary Islands; Mediterranean; Black sea.

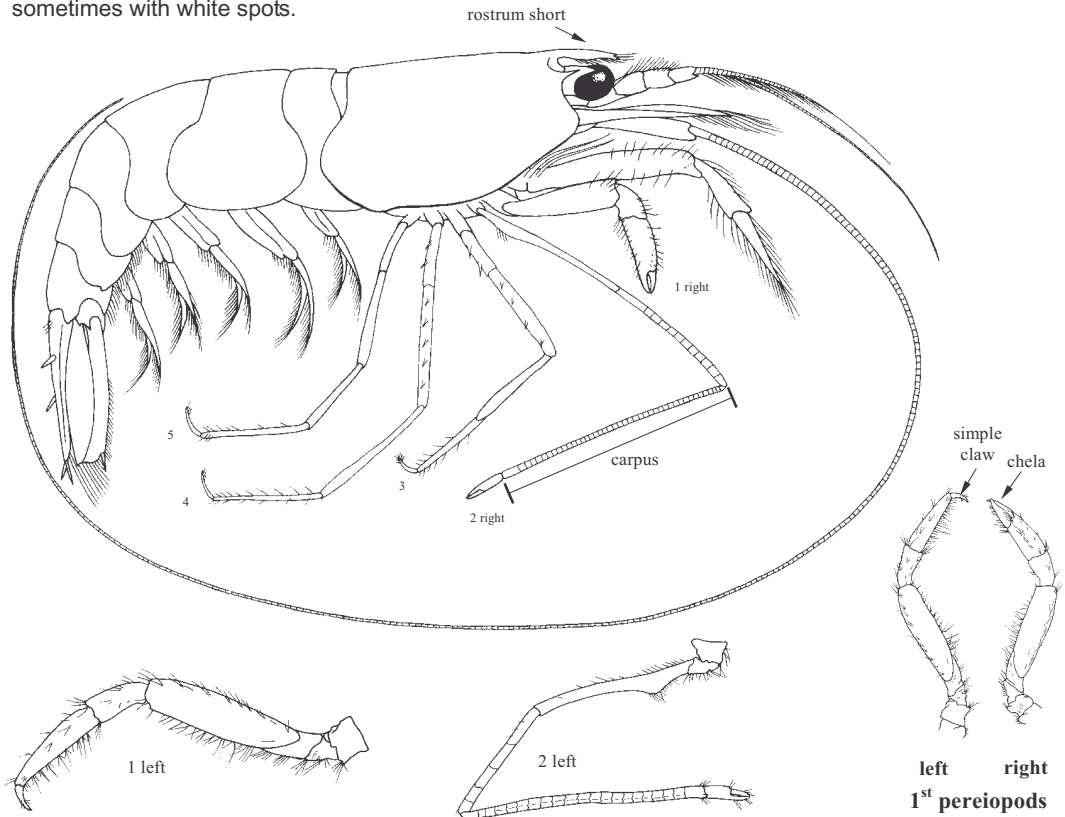


## Superfamily PROCESSOIDEA

### PROCESSIDAE

#### Processid shrimps

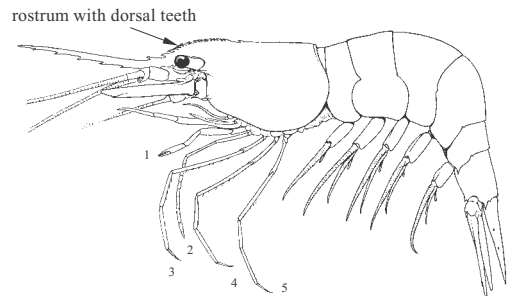
**Diagnostic characters:** Shrimps of small to moderate size; body cylindrical. **Rostrum slender and forward directed, not or just extending beyond eyes, with 2 small distal teeth.** Carapace smooth with antennal spine only, sometimes with deep postorbital groove. Pereiopods without exopods. **First pereiopods unequal, right pereiopod with distinct chela, left pereiopod simple.** Second pereiopods also unequal, right pereiopod much longer than left (except in *Processa modica*), chela small, carpus and merus multi-articulate. **Colour:** translucent pink, pale brown or green, with red chromatophores, sometimes with white spots.



**Habitat, biology, and fisheries:** Shrimps living near the shore to depths over 200 m. The majority of species hide in the mud or sand during the day and come out during the night when they are more active.

#### Similar families occurring in the area

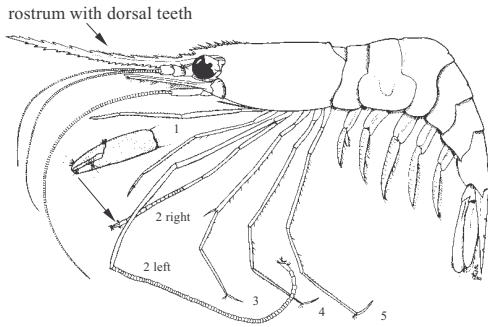
Hippolytidae: rostrum with dorsal teeth. First pair of pereiopods equal, stouter and usually shorter than second pair.



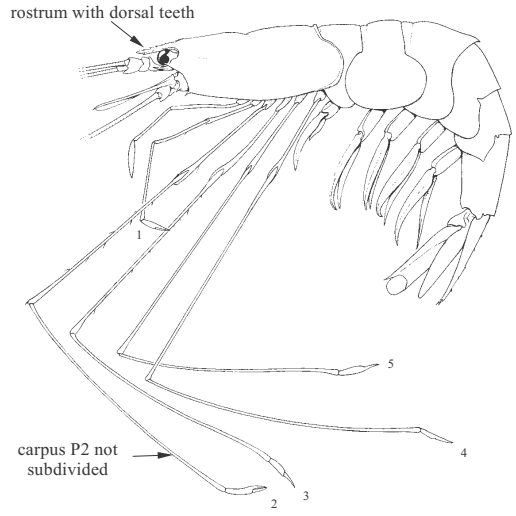
**Hippolytidae**

**Pandalidae:** rostrum with dorsal teeth. First pair of pereiopods equal, without or with minute chela.

**Nematocarcinidae:** rostrum with dorsal teeth. Pereiopods extremely long; chela of first and second pair of pereiopods similar in size and form; carpus of second pereiopods not subdivided.



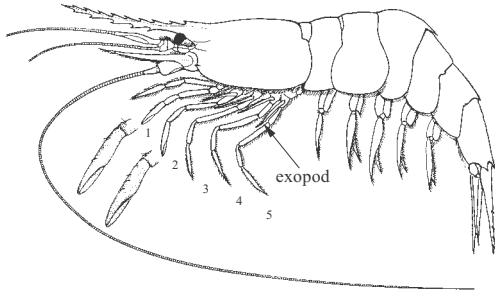
**Pandalidae**



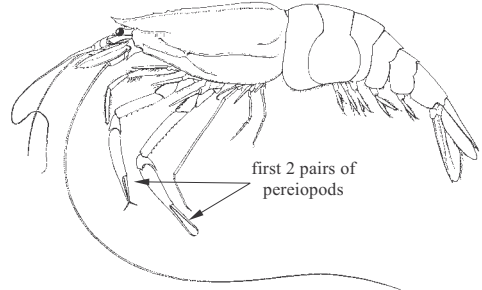
**Nematocarcinidae**

**Oplophoridae:** all pereiopods with exopods. Chela of first and second pair of pereiopods similar in size and form; carpus of second pereiopods not subdivided.

**Pasiphaeidae:** body strongly compressed. Pereiopods with exopods; chela of first and second pair of pereiopods similar in size and form; carpus of second pereiopods not subdivided.



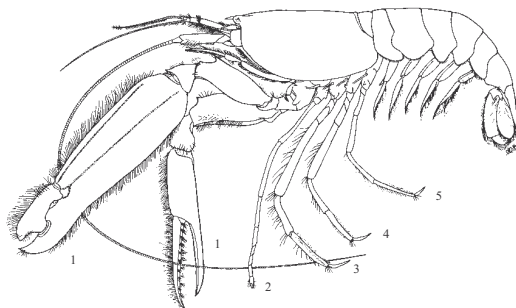
**Oplophoridae**



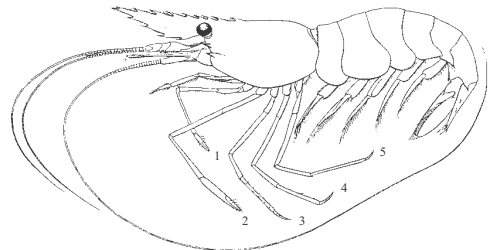
**Pasiphaeidae**

**Alpheidae:** eyes covered by carapace. First pair of pereiopods much stronger than second.

**Palaemonidae:** rostrum with dorsal teeth. Second pair of pereiopods similar, larger than first pair; carpus not subdivided.



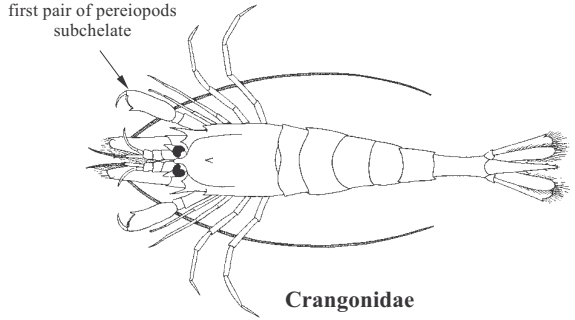
**Alpheidae**



**Palaemonidae**

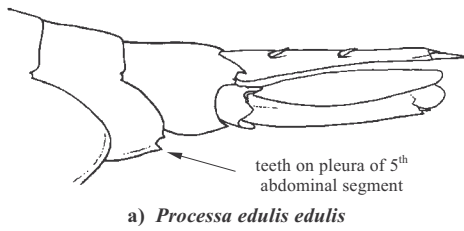
Crangonidae: first pair of pereiopods similar, much larger than second pair, subchelate.

Penaeidea and Stenopodidae: third pair of pereiopods with chelae. In Penaeidae the pleura of the second abdominal somite overlapping those of first and third abdominal somites.

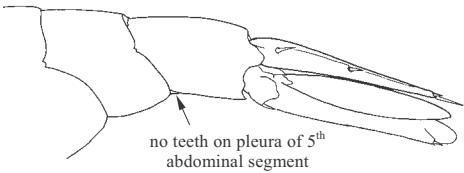


**Key to the species of *Processa* occurring in the area**

- 1a. Pleura of fifth abdominal segment with 1 or more posterolateral teeth (Fig. 1a) . . . . . → 2
- 1b. Pleura of fifth abdominal segment rounded or angular, but without posterolateral tooth (Fig. 1b) . . . . . → 7
- 2a. Carapace without postorbital groove (Fig. 2a); ventral margin of rostrum sinuous . . . . . → 3
- 2b. Carapace with distinct postorbital groove (Fig. 2b); ventral margin of rostrum convex . . . . . → 4

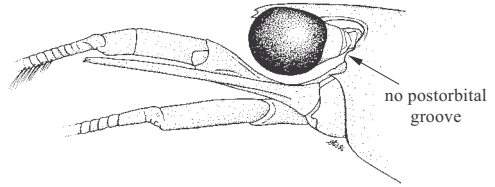


a) *Processa edulis edulis*

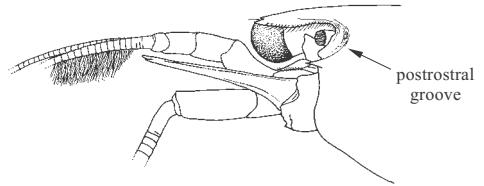


b) *Processa noveli noveli*

**Fig. 1 posterior part of abdomen**



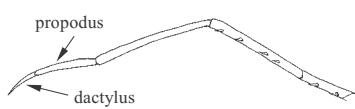
a) *Processa macrodactyla*



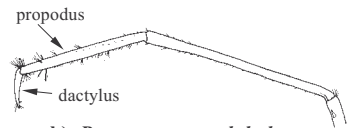
b) *Processa robusta*

**Fig. 2 anterior part of carapace**

- 3a. Dactylus of third and fourth pair of legs at least half as long as propodus (Fig. 3a)



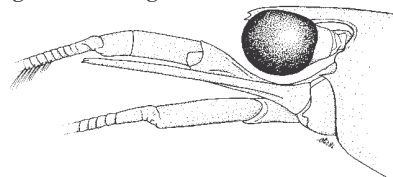
a) *Processa macrodactyla*



b) *Processa macrophthalma*

**Fig. 3 fourth leg**

- 3b. Dactylus of third and fourth pair of legs less than third of length of propodus (Figs 3b and 4). . . *Processa macrophthalma*



**Fig. 4 *Processa macrophthalma***

- 4a. Anterolateral margin of stylocerite rounded (Fig. 5a) . . . . . → 5
- 4b. Anterolateral margin of stylocerite angular or with tooth (Figs 5b and 6) . . . **Processa intermedia**

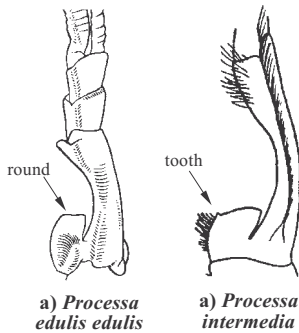


Fig. 5 stylocerite

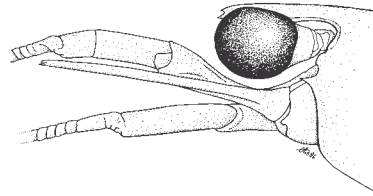


Fig. 6 *Processa intermedia*

- 5a. Second legs slightly unequal; merocarpal joint of right second leg not reaching distal margin of scaphocerite, carpus with 18 to 24 segments (Figs 7a and 8) . . . . . **Processa robusta**
- 5b. Second legs very unequal; merocarpal articulation of right second leg overreaching distal margin of scaphocerite, carpus with 25 or more segments (Fig. 7b) . . . . . → 6

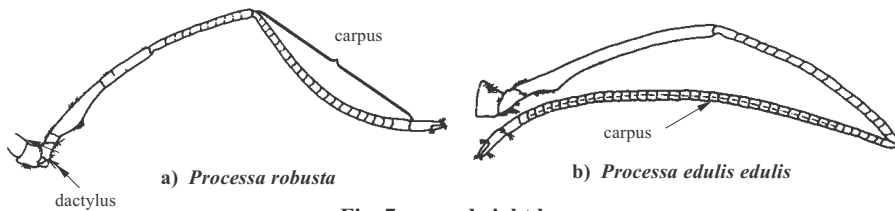


Fig. 7 second right leg

- 6a. Second article of antennular peduncle about as long as wide (Fig. 9); right second leg with 10 to 12 segments on merus, 25 to 31 on carpus; left with 4 to 6 on merus and 13 to 17 on carpus. . . **Processa compacta**
- 6b. Second article of antennular peduncle 1.5 to 2 times as long as wide (Fig. 10); right second leg with 12 to 21 segments on merus, 31 to 49 on carpus; left with 5 to 7 on merus and 17 to 24 on carpus. . . . **Processa edulis edulis**

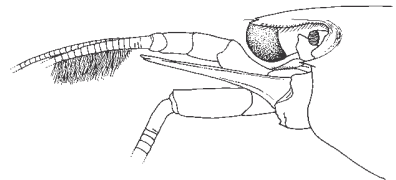


Fig. 8 *Processa robusta*

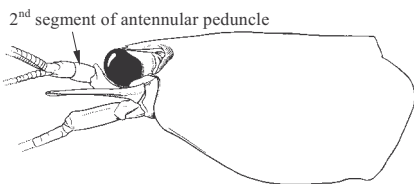


Fig. 9 *Processa compacta*

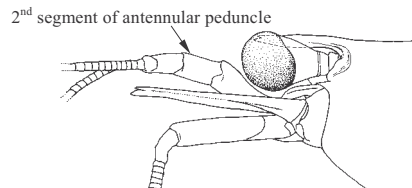


Fig. 10 *Processa edulis edulis*

- 7a. Second legs equal or subequal; right second leg with merocarpal articulation just reaching distal margin of first segment of antennular peduncle, carpus with less than 15 segments . . . . . → 8
- 7b. Second legs unequal; right second leg with merocarpal articulation overreaching distal margin of first segment of antennular peduncle; carpus with more than 16 segments . . . . . → 9

- 8a. Stylocerite with a moderately large lateral tooth and a small median tooth (Fig. 11); carpus of second pereiopod with 10 to 15, usually 11, segments . . . . . ***Processa parva***
- 8b. Stylocerite with anterolateral tooth only; carpus of second leg with 11 to 15, usually 11, segments (Fig. 12) . . . . . ***Processa modica carolii***

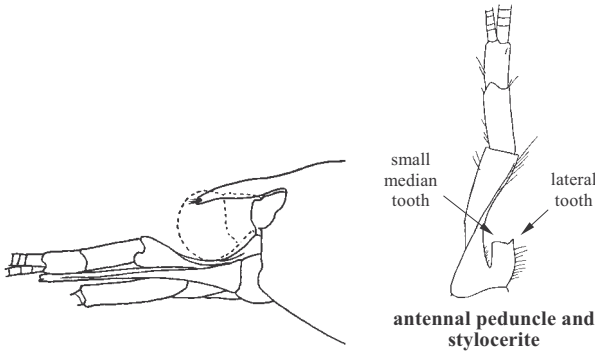


Fig. 11 *Processa parva*

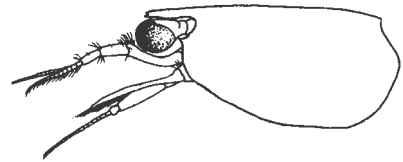


Fig. 12 *Processa modica carolii*

- 9a. Right second leg slightly longer than left; merocarpal articulation of right second leg not overreaching distal margin of scaphocerite; carpus with 17 to 33 segments (Fig. 13) . . . . . ***Processa elegantula***
- 9b. Right second legs much longer than left; merocarpal articulation of right second leg overreaching distal margin of scaphocerite; carpus with 21 to 69, usually more than 30, segments . . . . . **→ 10**

- 10a. Lateral plate of sixth abdominal segment with posterior tooth (Fig. 14); ventral margin of pleura of fifth abdominal segment straight or slightly concave; carpus of right second leg with 40 to 62 articles; large sized species (70 mm) . . . . . ***Processa canaliculata***
- 10b. Lateral plate of sixth abdominal segment without posterior tooth . . . . . **→ 11**

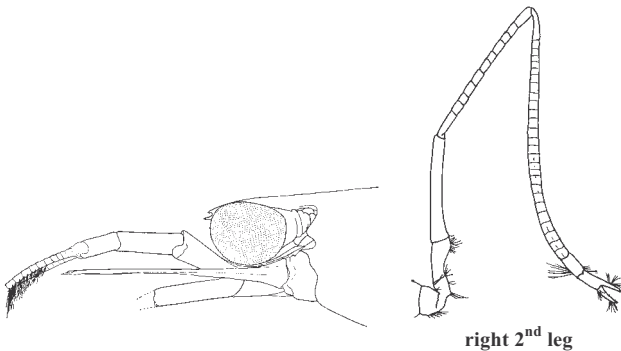


Fig. 13 *Processa elegantula*

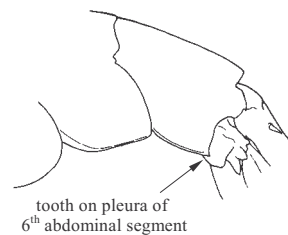


Fig. 14 *Processa canaliculata*

- 11a. Stylocerite obliquely truncate, without anterolateral tooth or angle . . . . . **→ 12**
- 11b. Stylocerite truncate with straight anterior margin, with anterolateral angle or tooth; antennal basicerite with lateral spine; ventral margin of pleura of fifth abdominal segment rounded; carpus of right second leg with 30 to 37 segments; small sized species (30 mm) (Fig. 15) . . . ***Processa noveli noveli***

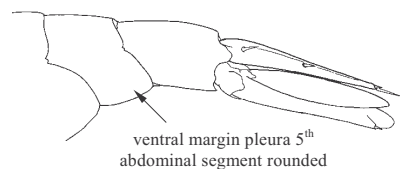
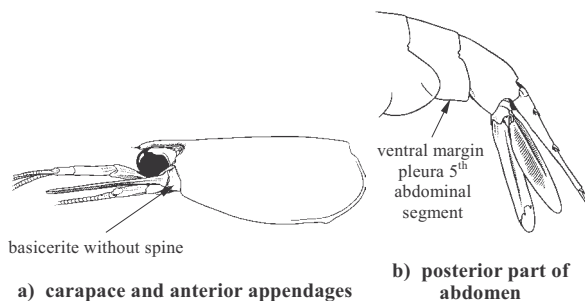
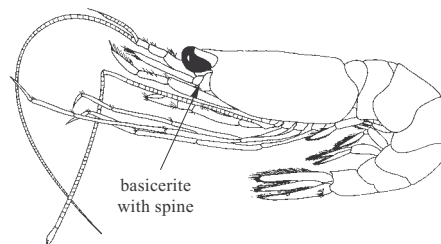


Fig. 15 *Processa noveli noveli*

- 12a.** Antennal basicerite without spine (Fig. 16a); ventral margin of pleura of fifth abdominal segment concave (Fig. 16b); carpus of right second leg with 33 to 36 segments  
 . . . . . ***Processa borboronica***
- 12b.** Antennal basicerite with spine; ventral margin of pleura of fifth abdominal segment rounded; carpus of right second leg with 30 to 37 segments (Fig. 17). . . . . ***Processa namibiensis***






**Fig. 16** *Processa borboronica*



**Fig. 17** *Processa namibiensis*

#### List of species occurring in the area

The symbol  is given when species accounts are included.

- Processa borboronica* Holthuis, 1951.  
 *Processa canaliculata* Leach, 1815.  
*Processa compacta* Crosnier, 1971.  
 *Processa edulis edulis* (Risso, 1816).  
*Processa elegantula* Nouvel and Holthuis, 1957.  
*Processa intermedia* Holthuis, 1951.  
*Processa macrodactyla* Holthuis, 1952.  
*Processa macrophthalma* Nouvel and Holthuis, 1957.  
*Processa modica carolii* Williamson in Williamson and Rochanaburanon, 1979.  
*Processa namibiensis* Macpherson, 1983.  
*Processa nouveli nouveli* Al-Adhub and Williamson, 1975.  
*Processa parva* Holthuis, 1951.  
*Processa robusta* Nouvel and Holthuis, 1957.

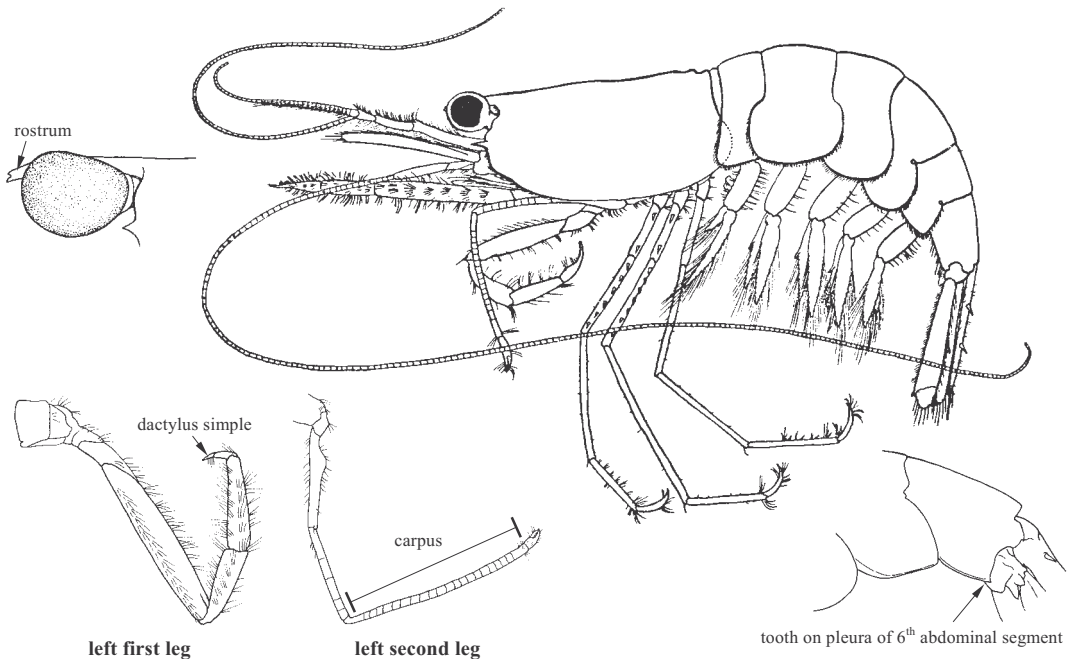
#### References

- Holthuis, L.B.** 1987. Crevettes. In W. Fischer, M. Schneider & M.-L. Bauchot (eds). *Fiches FAO d'identification des espèces pour les besoins de la Peche (Révision 1). Méditerranée et Mer Noire. Zone de Peche 37.* Rome, FAO. pp. 189–292.
- Macpherson, E.** 1983. Crustáceos Decápodos capturados en las costas de Namibia. *Resultados de Expediciones Científicas (suppl. Investigación Pesquera Barcelona)*, 11: 3–79.
- Nouvel, H. & Holthuis, L.B.** 1957. Les Processidae (Crustacea Decapoda Natantia) des eaux Européennes. *Zoologische Verhandelingen Leiden*, 32: 1–53, figures 1–220.

***Processa canaliculata* Leach, 1815**

**Frequent synonyms / misidentifications:** *Processa mediterranea* - Zariquiey Alvarez, 1956 / None.

**FAO names:** **En** – Processa shrimp; **Fr** – Guernade processe; **Sp** – Camarón procesa.



**Diagnostic characters:** Rostrum straight, although often slightly downcurved at apex; deepest in posterior half in profile; dorsal terminal tooth normally  $>0.5$  times length of ventral. Carapace with antennal spine; without postorbital groove. Stylocerite with tooth on anterior external corner, tooth  $<0.15$  times maximum width of scaphocerite. Scaphocerite longer than antennal peduncle by half maximum scaphocerite width or little more; inner border sinuous, outer border slightly convex. Third maxilliped about 1.33 times length of scaphocerite, sometimes little more; exopod present. Mandible with molar process, but without incisor process or palp. First leg with small arthrobranch at base in adults, occasionally absent in juveniles; one first leg chelate, other simple. Second legs asymmetrical: **right second leg carpus with 41 to 43 segments**, merus with 16 to 19 (rarely up to 24) segments; left second leg carpus with 18 to 22 (rarely up to 28) segments, merus with 4 to 8 (rarely up to 11) segments. **Ventroposterior corner of pleonite 5 ventrally straight, without tooth. Pleonite 6 with short posteriorventral tooth.** Telson with 2 pairs of lateral spines, anterior pair arising well behind anterior transverse row of setae on telson. **Colour:** pink, with reddish orange transverse bands, becoming darker on the abdomen.

**Size:** Maximum total length 6.7 cm (male), 7.5 cm (female).

**Habitat, biology, and fisheries:** Occurring in depths between 70 to 600 m on muddy bottoms. The species is of commercial importance in the western Mediterranean Sea. It is occasionally present in Moroccan markets. Marketed fresh and as bait.

**Distribution:** Eastern Atlantic: British Isles to northern Morocco; Mediterranean Sea: western and central part as far as the Aegean Sea and Crete, absent in the northern Adriatic and the Black Sea.

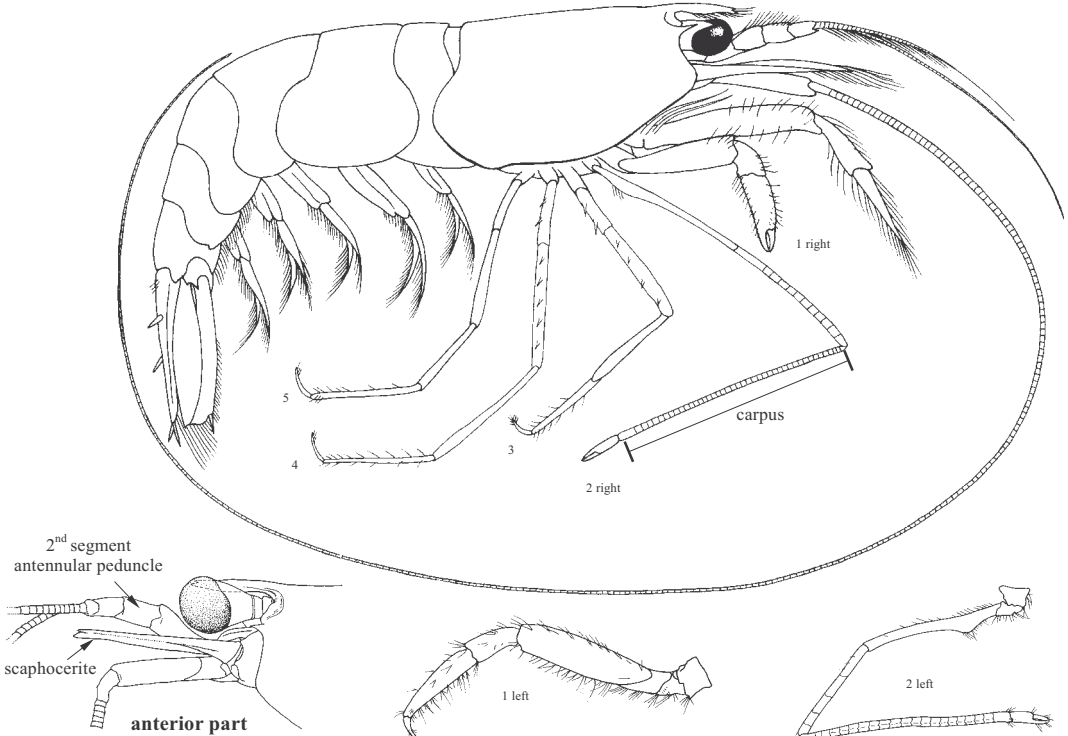




***Processa edulis edulis* (Risso, 1816)**

**Frequent synonyms / misidentifications:** *Nika edulis* Risso, 1816 / None.

**FAO names:** **En** – Nika shrimp; **Fr** – Guernade nica; **Sp** – Camarón nica.

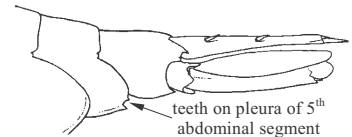


**Diagnostic characters:** Rostrum straight, tip bifid, not extending beyond eye, dorsal and ventral margin convex. Carapace with antennal spine and with distinct postorbital groove. Second segment of antennular peduncle 1.5 to 2 times longer than wide; anterolateral margin of stylocerite rounded. First legs unequal, right leg chelate, left simple. Second legs very asymmetrical: right second leg much longer than left; carpus of 33 to 45 segments on right versus; 18 to 22 (rarely up to 27) on left. Ventroposterior corner of fifth pleonite with 1 or 2 teeth. **Colour:** pale green (when chromatophores retracted), pinkish or red, with reddish bands on abdomen; scattered white spots on body.

**Size:** Maximum total length 5 cm (male), 6 cm (female).

**Habitat, biology, and fisheries:** Occurring in shallow waters with vegetation, often among *Zostera*, *Cymodocea* and *Posidonia*. Of minor commercial interest in the Mediterranean; of no commercial interest in the present fishing areas. Regularly found in markets in northern Italy, rarely in those of France and Greece. The species is marketed fresh and as bait.

**Distribution:** Eastern Atlantic: coast of Spain and Morocco. Mediterranean Sea, but not present in the Black Sea.



abdomen

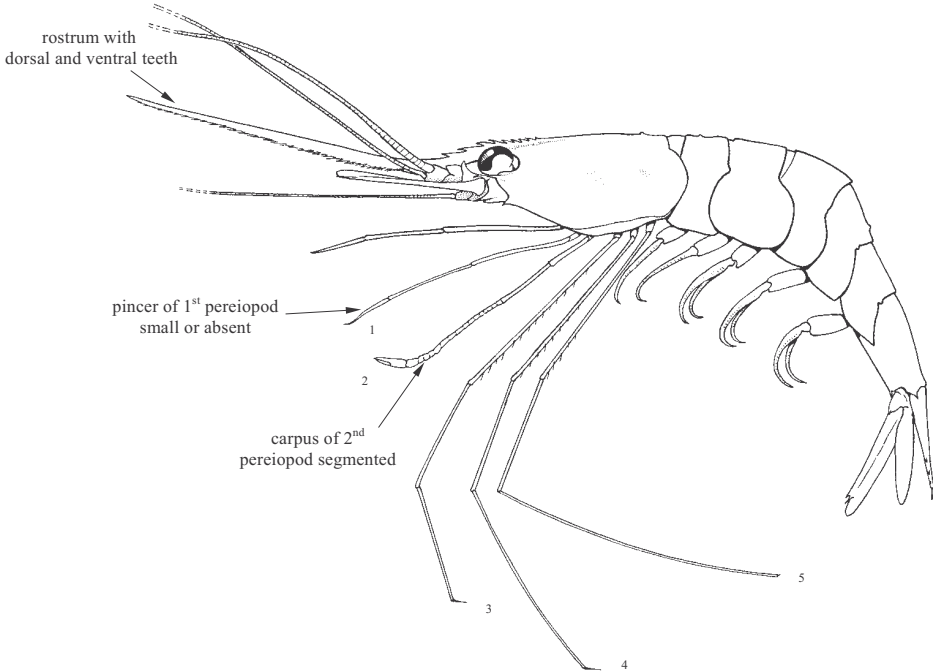


**Superfamily PANDALOIDEA**

**PANDALIDAE**

**Pandalid shrimps**

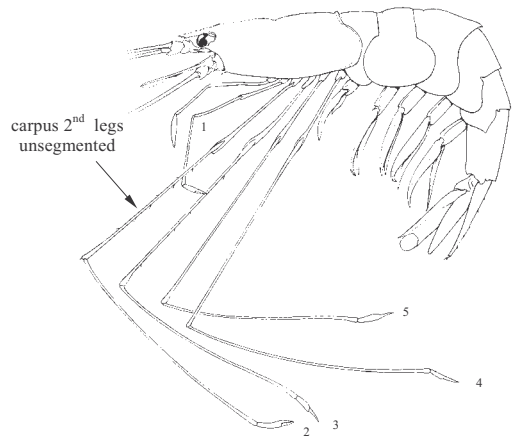
**Diagnostic characters:** Shrimps of small to medium size, some large. Rostrum well developed, often sabre-like, with dorsal and ventral teeth. Carapace glabrous or covered by miniscule scales. **Pincers in first pair of legs very small or absent. Second legs with pincers; carpus of second legs segmented. Third to fifth legs long and slender.** As in the other families belonging to the infraorder Caridea, the pleura of the second abdominal segment overlap those of first and third segments, and the third pair of pereiopods lacks pincers.



**Habitat, biology, fisheries:** This family includes a large number of marine species, most of them benthic and occurring in deep waters. Since they are generally of rather large size, many of them are or may be of interest to fisheries.

**Similar families occurring in the area**

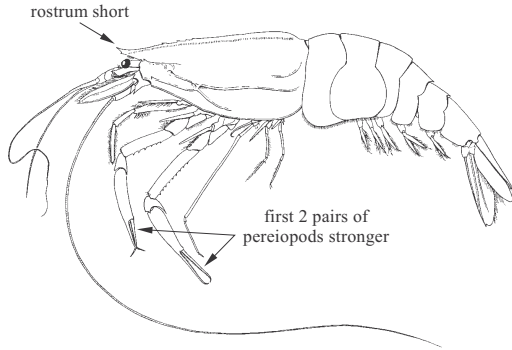
**Nematocarcinidae:** first 2 pairs of legs similar and ending in pincers, their carpus unsegmented; the following pairs extremely elongate.



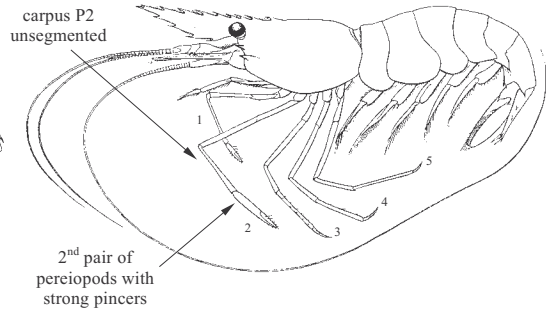
**Nematocarcinidae**

Pasiphaeidae: body strongly compressed; rostrum short; legs of first 2 pairs much larger and stronger than those of following pairs.

Palaemonidae: first pair of legs with small pincers; second pair much better developed and bearing strong pincers, their carpus unsegmented.



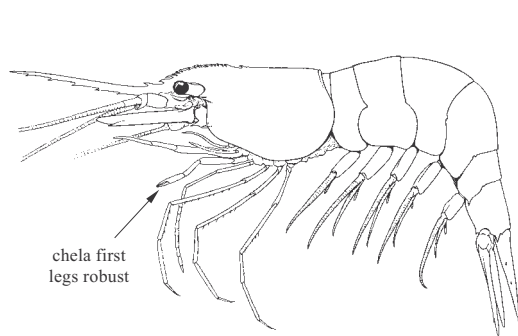
**Pasiphaeidae**



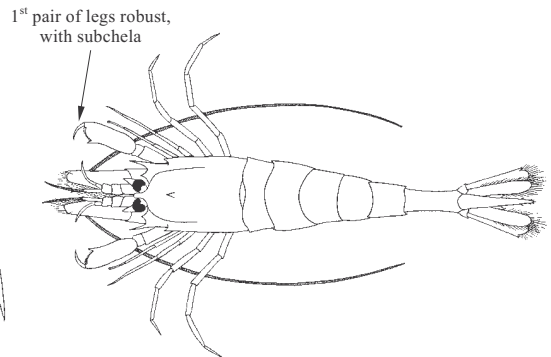
**Palaemonidae**

Hippolytidae: legs of first pair rather robust, ending in well-developed pincers.

Crangonidae: first pair of legs very robust with incomplete pincers (subchela) lacking the fixed finger; body depressed.

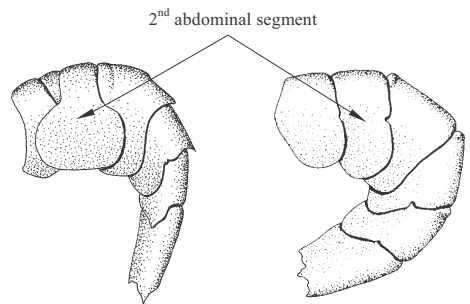


**Hippolytidae**



**Crangonidae**

Penaidean shrimps: pleura of second abdominal segment not overlapping those of first segment; 3 first pairs of legs ending in pincers.



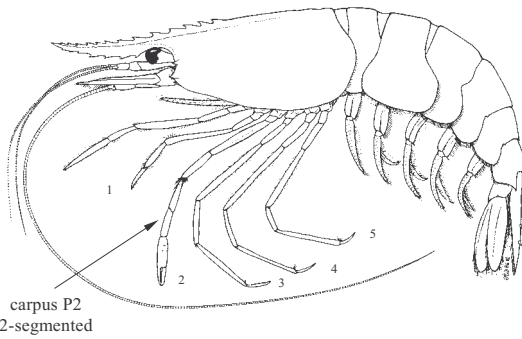
**Caridea**

abdomen

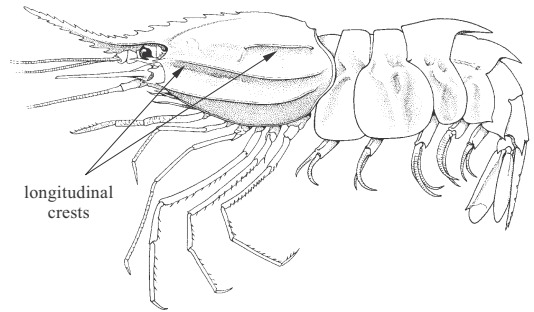
**Penaeidae**

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

- 1a. Carpus in second pair of legs divided into 2 segments (Fig. 1) . . . . . ***Chlorotocus***
- 1b. Carpus in second pair of legs divided into more than 3 segments . . . . . → 2
  
- 2a. Longitudinal crests running through entire length of sides of carapace (Fig. 2) . . . . . ***Heterocarpus***
- 2b. No crests running through entire length of sides of carapace . . . . . → 3

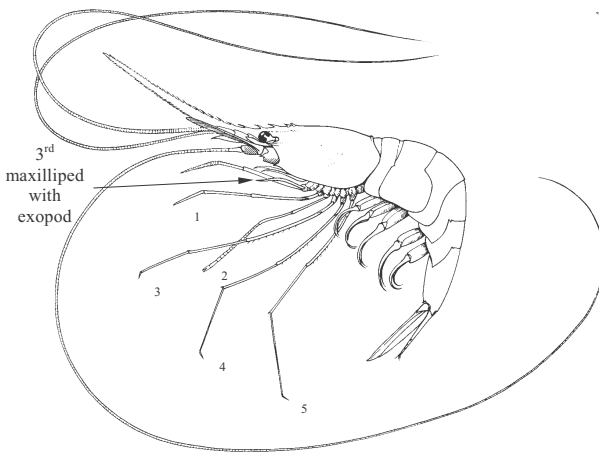


**Fig. 1 *Chlorotocus crassicornis***

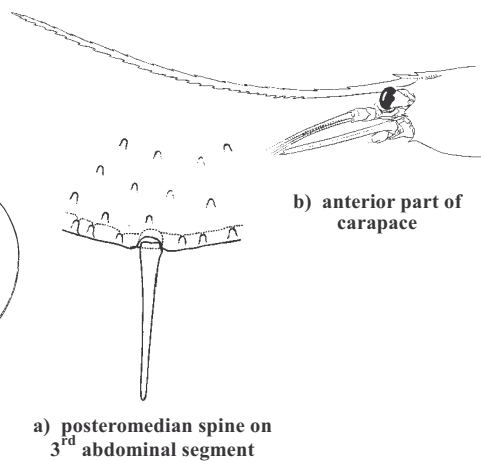


**Fig. 2 *Heterocarpus ensifer***

- 3a. Third maxilliped with exopod (Fig. 3). . . . . → 4
- 3b. Third maxilliped without exopod . . . . . → 5
  
- 4a. Abdomen with third somite unarmed or with fixed posteromedial tooth . . . . . ***Plesionika***
- 4b. Abdomen with third somite bearing slender, basally articulated posteromedial spine or stout seta (Fig. 4a) . . . . . ***Stylopandalus***



**Fig. 3 *Plesionika edwardsii***



a) posteromedial spine on 3<sup>rd</sup> abdominal segment

**Fig. 4 *Stylopandalus richardi***

b) anterior part of carapace

- 5a. Dorsal rostral teeth spaced (Fig. 5); no arthrobranchs present at the bases of the legs . . . *Pandalina*
- 5b. Dorsal rostral teeth closely set (Fig. 6); arthrobranchs present at bases of first four legs (concealed under carapace) . . . . . *Bitias*

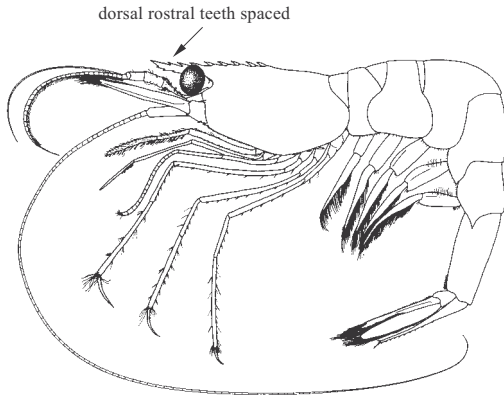


Fig. 5 *Pandalina profunda*

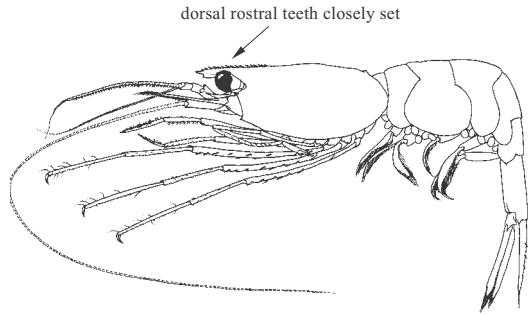


Fig. 6 *Bitias stocki*

**Key to the species of *Heterocarpus* occurring in the area**

- 1a. Dorsal margin of rostrum toothed at base only; carapace with 2 lateral carinae . . . . . → 2
- 1b. Dorsal margin of rostrum toothed throughout; carapace with 3 lateral carinae (Fig. 7) . . . . . *Heterocarpus ensifer*

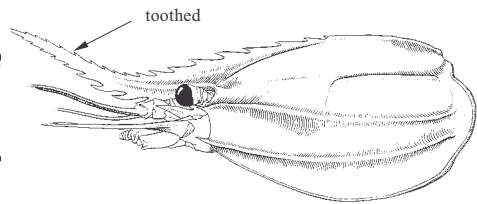


Fig. 7 *Heterocarpus ensifer*

- 2a. Third abdominal segment with distinct dorsal carina and posterior median tooth; antennal spine much longer than branchiostegal spine; third maxilliped without exopod (Fig. 8) . . . *Heterocarpus grimaldii*
- 2b. Third abdominal segment without distinct dorsal carina, with posterior margin rounded; antennal spine much shorter than branchiostegal spine; third maxilliped with exopod (Fig. 9) . . . . . *Heterocarpus laevigatus*

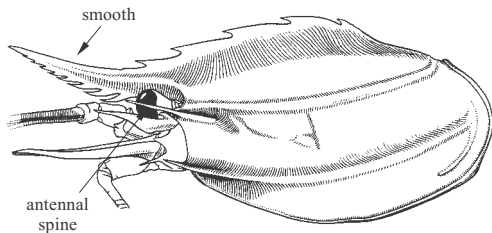


Fig. 8 *Heterocarpus grimaldii*

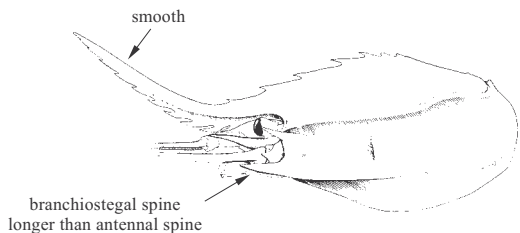
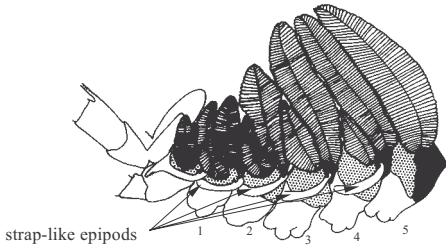


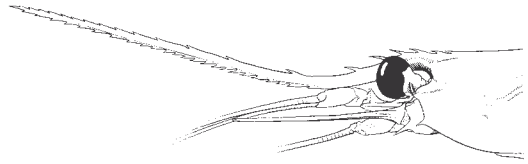
Fig. 9 *Heterocarpus laevigatus*

**Key to the species of *Plesionika* occurring in the area**

- 1a. Without strap-like epipods on coxae of any legs . . . . . → 2
- 1b. Strap-like epipods on at least 2 anterior pairs of legs (Fig. 10). . . . . → 4
- 2a. Dorsal margin of rostrum with more than 30 closely set teeth at regular distances . . . . . → 3
- 2b. Dorsal margin with less than 30 teeth at variable distances, divided in 2 groups, the basal group separated from teeth on the rostrum proper by a distinct gap (Fig. 11) . . . . . *Plesionika brevipes*



**Fig. 10** epipods on coxae of legs



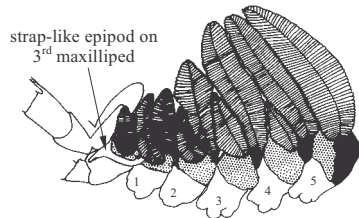
**Fig. 11** *Plesionika brevipes*

- 3a. Epipod well developed at third maxilliped (Fig. 12). . . . . *Plesionika narval*
- 3b. Epipod absent at third maxilliped (Fig. 13). . . . . *Plesionika longicauda*

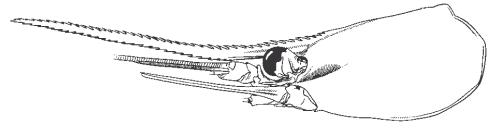
- 4a. Second legs very unequal, left much longer than right leg . . . . . → 5
- 4b. Second legs (sub)equal . . . . . → 7

- 5a. Rostrum short, about as long as scaphocerite; distal third of dorsal margin of rostrum without teeth (Fig. 14) . . . . . *Plesionika alexandri*

- 5b. Rostrum more than twice length of scaphocerite; distal part of dorsal margin of rostrum with teeth . . . . . → 6

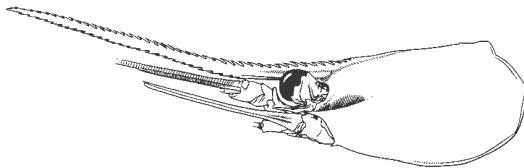


a) coxae of 3<sup>rd</sup> maxilliped and legs



b) carapace and anterior appendages

**Fig. 12** *Plesionika narval*



**Fig. 13** *Plesionika longicauda*



**Fig. 14** *Plesionika alexandri*

- 6a. Chela, carpus and distal half of merus, of left second leg and dactylus and distal half to third of carpus of right second leg extending beyond scaphocerite (Fig. 15); dactylus of third to fifth legs long, about 0.4 of propodus length . . . . . ***Plesionika heterocarpus***
- 6b. Distal margin of merus of left second leg and fingers of right second leg just reaching distal margin of scaphocerite (Fig. 16); dactylus of third to fifth legs short, about 0.3 of propodus length . . . . . ***Plesionika antigai***

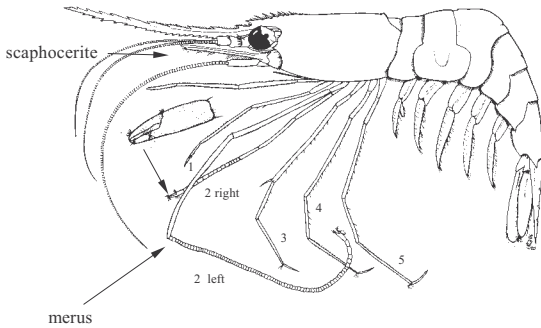


Fig. 15 *Plesionika heterocarpus*

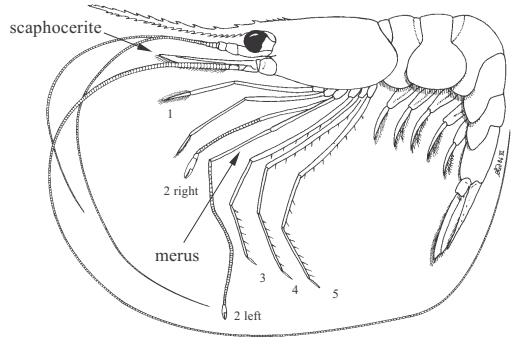


Fig. 16 *Plesionika antigai*

- 7a. Dorsal lamina of rostrum with teeth over entire length . . . . . → **8**
- 7b. Dorsal lamina or rostrum with few teeth at base only . . . . . → **11**

- 8a. Rostrum more than twice carapace length (Fig. 17) . . . . . ***Plesionika edwardsii***
- 8b. Rostrum less than twice carapace length . . . . . → **9**

- 9a. Eye without ocellus; ventral lamina of rostrum developed, broad . . . . . → **10**
- 9b. Eye with distinct ocellus; ventral lamina of rostrum not developed (Fig. 18) . . . . . ***Plesionika gigliolii***

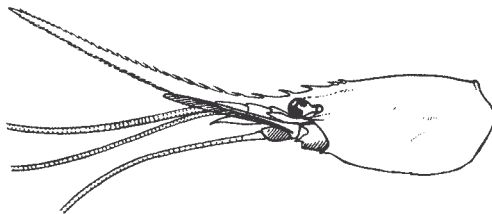


Fig. 17 *Plesionika edwardsii*

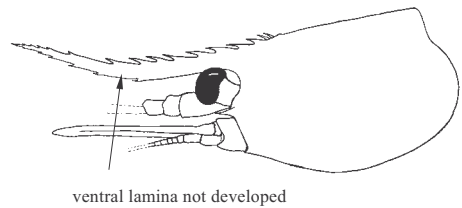


Fig. 18 *Plesionika gigliolii*

- 10a. Rostrum shorter than scaphocerite (Fig. 19) . . . . . ***Plesionika aff. acanthonotus***
- 10b. Rostrum longer than scaphocerite (Fig. 20) . . . . . ***Plesionika holthuisi***

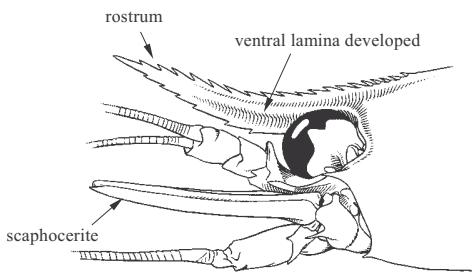


Fig. 19 *Plesionika aff. acanthonotus*

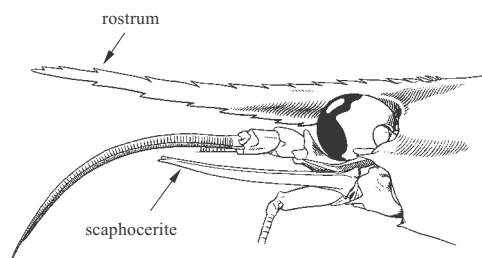


Fig. 20 *Plesionika holthuisi*

11a. Posterior margin of third abdominal segment with median tooth (Fig. 21a) . . . . . → 12

11b. Posterior margin of third abdominal segment without median tooth (Fig. 21b) . . . . . → 13

12a. Six to 13 ventral rostral teeth (Fig. 22); sixth abdominal segment twice as long as fifth . . . . . *Plesionika williamsi*

12b. Twentyeight to 50 ventral rostral teeth (Fig. 23); sixth abdominal segment about 2.5 times as long as fifth . . . *Plesionika ensis*

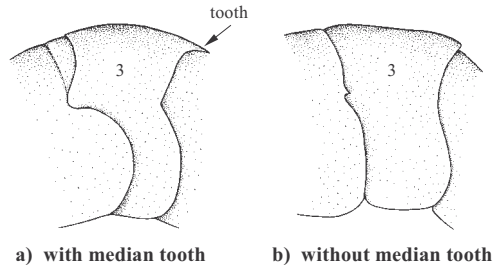


Fig. 21 3<sup>rd</sup> abdominal somite

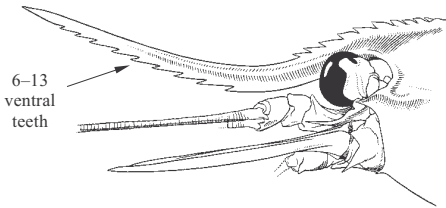


Fig. 22 *Plesionika williamsi*

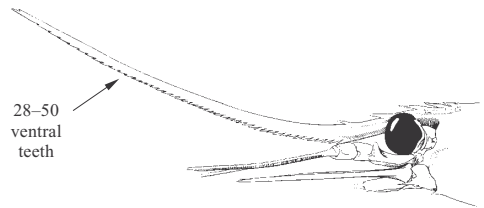


Fig. 23 *Plesionika ensis*

13a. Basis of fourth leg without epipod; carapace strongly carinate posterolaterally (Fig. 24) . . . . . → 14

13b. Basis of fourth leg with epipod; carapace without lateral carinae (Fig. 25) . . . . . *Plesionika martia martia*

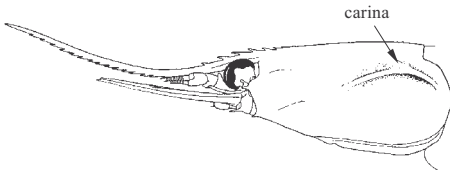


Fig. 24 *Plesionika carinata*

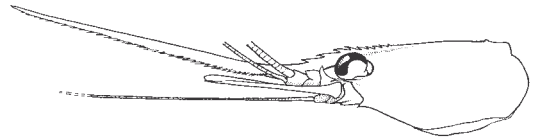


Fig. 25 *Plesionika martia martia*

14a. Distal part of ventral margin of rostrum without teeth (Fig. 26); 6 or 7 dorsal rostral teeth . . . . . *Plesionika carinata*

14b. Distal part of ventral margin of rostrum with teeth (Fig. 27); 5 (seldom 4 or 6) dorsal rostral teeth . . . . . *Plesionika rossignoli*

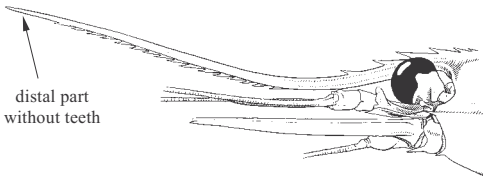


Fig. 26 *Plesionika carinata*

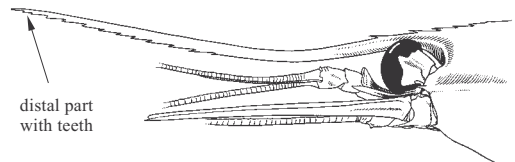



Fig. 27 *Plesionika rossignoli*




**List of species occurring in the area**

The symbol  is given when species accounts are included.

*Bitias stocki* Fransen, 1990.

 *Chlorotocus crassicornis* (Costa, 1871).

 *Heterocarpus ensifer* A. Milne Edwards, 1881.

 *Heterocarpus grimaldii* A. Milne Edwards and Bouvier, 1900.

 *Heterocarpus laevigatus* Bate, 1888.

*Pandalina brevirostris* (Rathke, 1843).

*Pandalina profunda* Holthuis, 1946.


 *Plesionika* aff. *acanthonotus* (S.I. Smith, 1882).


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

 *Plesionika antigai* Zariquiey Alvarez, 1955.

*Plesionika brevipes* (Crosnier and Forest, 1968).

*Plesionika carinata* Holthuis, 1951.

 *Plesionika edwardsii* (Brandt, 1851).


 *Plesionika ensis* (A. Milne Edwards, 1881).

*Plesionika gigliolii* (Senna, 1902).

 *Plesionika heterocarpus* (Costa, 1871).

*Plesionika holthuisi* Crosnier and Forest, 1968.

 *Plesionika longicauda* (Rathbun, 1901).

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

 *Plesionika narval* (Fabricius, 1787).

*Plesionika rossignoli* Crosnier and Forest, 1968.

 *Plesionika williamsi* Forest, 1964.

*Stylopandalus richardi* (Coutière, 1905).

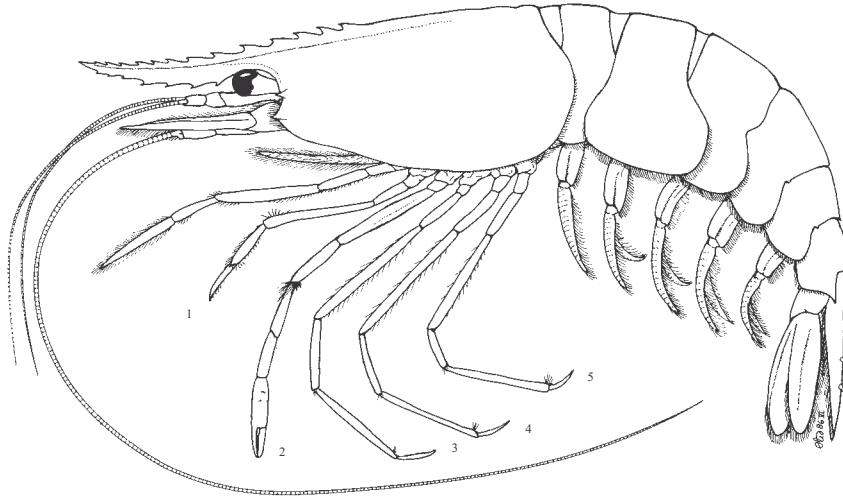
**References**

- Crosnier, A. & Forest, J.** 1973. Les crevettes profondes de l'Atlantique oriental tropical. *Faune Tropicale*, ORSTOM, Paris, 19: 1–409, figs 1–121.
- d'Udekem d'Acoz, C.** 1999. Inventaire et distribution des crustacés décapodes de l'Atlantique nord-oriental, de la Méditerranée et des eaux continentales adjacentes au nord de 25°N. Muséum National d'Histoire Naturelle, Paris, I–X: 1–383.
- Fransen, C.H.J.M. & Biscoito, M.J.** 2006. On two rare species of caridean shrimp from the hydrothermal fields Lucky Strike and Menez Gwen on the Mid-Atlantic Ridge. *Zoologische Mededelingen Leiden*, 80(4): 45–53.
- Holthuis, L.B.** 1993. The recent genera of Caridean and Stenopodidean shrimps (Crustacea, Decapoda): with an appendix on the order Amphionidacea. Nationaal Natuurhistorisch Museum, Leiden, 1–328 pp.

***Chlorotocus crassicornis* (Costa, 1871)**

**Frequent synonyms / misidentifications:** *Pandalus crassicornis* Costa, 1871 / None.

**FAO names:** En – Green shrimp; Fr – Crevette verte; Sp – Camarón verde.

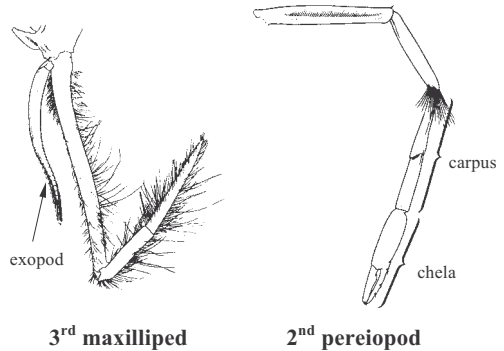


**Diagnostic characters:** Shrimp of moderate size. **Rostrum extending just beyond distal edge of antennal scale; dorsal margin with 10 to 14 teeth of which 4 are situated behind the orbit; ventral margin with 4 to 7 teeth.** Third maxilliped with exopod. First pair of legs without chelae. **Second pair of legs with distinct chelae; chelae slightly longer than half of carpus length; carpus divided in 2 segments;** sixth abdominal somite with slender submarginal tooth at posteroventral angle. **Colour:** body whitish with variable tones of red.

**Size:** Maximum total length 7.8 cm (commonly 6 cm).

**Habitat, biology, and fisheries:** Occurring at depths between 3 to 600 m (most commonly 200 to 450 m); on mud and sandy mud bottoms. The species has been recorded from Moroccan markets. Commercially fished mostly in Italy and Spain. Also listed among the edible shrimps of Tunisia, Algeria and Greece. Caught off the coast of Natal, South Africa, but often not marketed.

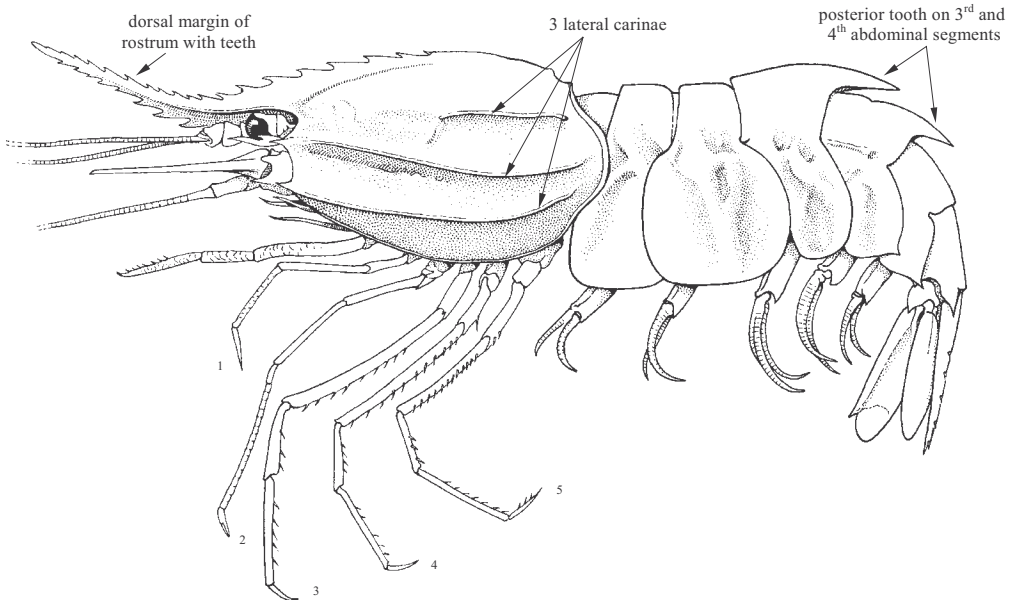
**Distribution:** Eastern Atlantic: from southern Spain (and Bay of Biscay) to Namibia; Mediterranean; Indo-West Pacific: eastern and southern Africa, the Andaman Sea, the South and East China Seas, Korea Strait, Philippines and Indonesia.



***Heterocarpus ensifer* A. Milne Edwards, 1881**

**Frequent synonyms / misidentifications:** *Heterocarpus carinatus* (Smith, 1882) / None.

**FAO names:** **En** – Armed nylon shrimp; **Fr** – Crevette nylon armée; **Sp** – Camarón nailon armado.



**Diagnostic characters:** Rostrum well developed and **toothed throughout its dorsal and ventral margins; number of teeth usually ranging from 17 to 19 dorsal and 8 to 10 ventral** (extreme variations 13 to 19 and 8 to 13, respectively). **Carapace ornamented with 3 lateral carinae**; upper lateral carina apparently terminating in hepatic region, but in fact continuing forward – scarcely visible – to orbital margin; other carinae quite prominent throughout length of carapace and ending, one at antennal spine and other at branchiostegal spine. **Stylocerite reaching anteriorly to middle of second article of antennular peduncle. Distinct mid-dorsal keel ending posteriorly in strong tooth on abdominal segments 3 and 4.** **Colour:** general background nacreous pink with red blotches on carapace and thorax as well as abdominal appendages; ripe ovaries and eggs blue.

**Size:** Maximum total length: 14.2 cm.

**Habitat, biology, and fisheries:** Inhabits muddy bottoms on the deeper part of the continental shelf and on the continental slope, between 150 and about 900 m depth. It is rather common, but never forming dense populations. Berried females have been observed from March to August. It may be of interest as bycatch in shrimp fisheries on the continental slope. It is of potential commercial importance. Caught with bottom trawls and traps. Experimental fishing with traps is being carried out in the Canary Islands. Marketed fresh and frozen.

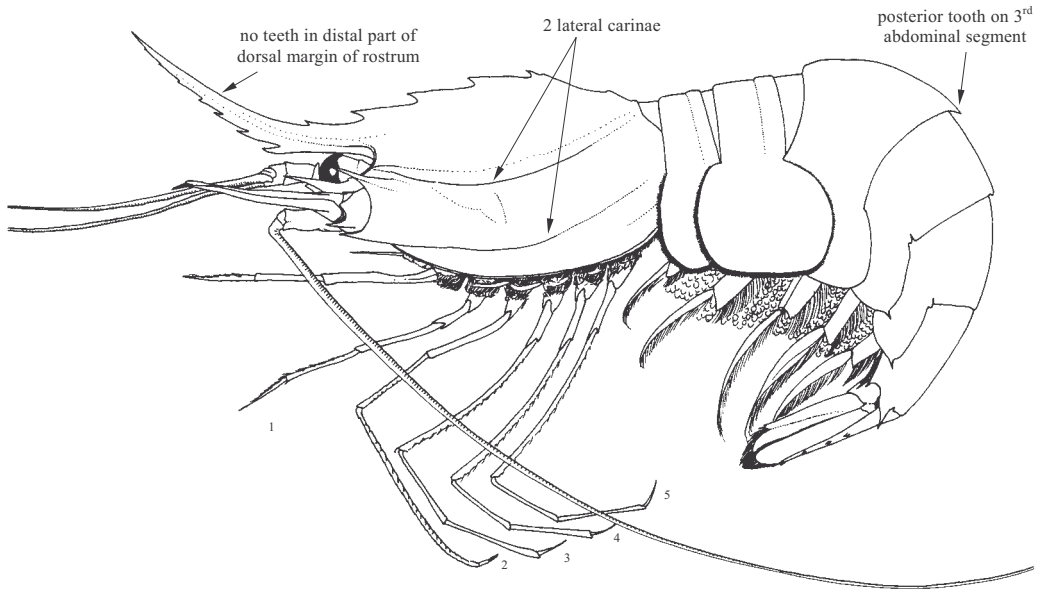
**Distribution:** Eastern Atlantic: from off southern Spain and Madeira south to the Congo and Angola. Western Atlantic: from off North Carolina (USA) south to the Gulf of Mexico and the Caribbean Sea near the Guiana's.



***Heterocarpus grimaldii* A. Milne Edwards and Bouvier, 1900**

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

**FAO names:** En – Grimaldi shrimp; Fr – Crevette Grimaldi; Sp – Camarón de los Grimaldi.



**Diagnostic characters:** Rostrum much shorter than carapace in large specimens, slightly longer than carapace in small specimens of about 12 mm, **with 6 or 7 dorsal teeth of which posterior 3 to 5 situated behind the orbit, rostrum proper almost devoid of teeth except for 1 or 2 above the eye; ventral margin with 7 to 11 teeth.** Carapace with 2 strong lateral carinae extending almost to posterior margin of carapace; dorsalmost lateral carina rather straight, originating posterior of orbit, not in line with antennal spine; ventralmost lateral carina originating in line with branchiostegal spine, posteroventral carina present; **branchiostegal spine much shorter than antennal spine. Stylocerite extending anteriorly beyond second article of antennular peduncle.** Scaphocerite about half as long as carapace, distolateral tooth extending slightly beyond distal lamina. Third abdominal somite with dorsomedian carina ending in posterior tooth; fourth and fifth abdominal somites without carinae, nor posterior spines. **Colour:** body and appendages in various red tones.

**Size:** Maximum total length 17 cm.

**Habitat, biology, and fisheries:** Occurring at depths between 914 to 2 834 m, on muddy bottoms on the continental slope. Of potential commercial interest. Experimental fishing with traps is being carried out in the Canary Islands and the Azores.

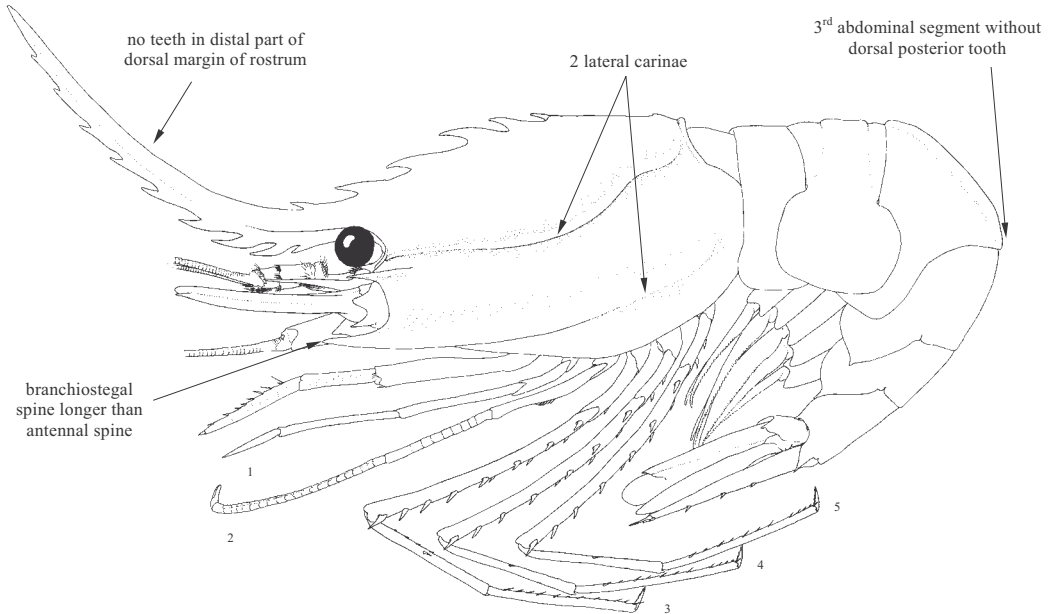
**Distribution:** Eastern Atlantic: Azores and off Portugal south to Angola.



***Heterocarpus laevigatus* Bate, 1888**

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

**FAO names:** **En** – Smooth nylon shrimp; **Fr** – Crevette nylon inerme; **Sp** – Camarón nailón liso.



**Diagnostic characters:** Rostrum varying from less than 1.25 to more than 1.5 times as long as carapace in juveniles to shorter than carapace in largest adults, without distinct lateral carina, **armed dorsally with 6 to 10, usually 6 or 7, teeth on carapace and basal part of rostrum, including 5, less commonly 4 or 6, positioned on carapace behind the orbit, and ventrally with 6 to 13 teeth, most commonly 10 or 11.** Carapace with 2 strong lateral carinae extending almost to posterior margin of carapace; dorsalmost lateral carina straight anteriorly, sinuous posteriorly, originating posterior to orbit, not aligned with antennal spine; ventralmost lateral carina originating at base and in alignment with branchiostegal spine, posteroventral carina obscure; **branchiostegal spine much longer than antennal spine.** **Stylocerite extending anteriorly beyond second article of antennular peduncle.** Scaphocerite about 0.5 to 0.6 length of carapace, distolateral tooth as long as distal lamina. **Abdomen unarmed dorsally**, rounded on first and second somites, with blunt median carina on third, fourth and fifth somites and slightly sulcate median area on 6th somite. **Colour:** body and appendages in various red tones.

**Size:** Maximum total length 18 cm. Probably the largest species of the genus.

**Habitat, biology, and fisheries:** Occurring at depths between 302 and 1 156 m (commonly between 366 and 836 m). Living on sand or sandy mud bottoms. Demersal. Of potential commercial interest. Experimental fishing with traps is being carried out in the Canary Islands and the Azores.

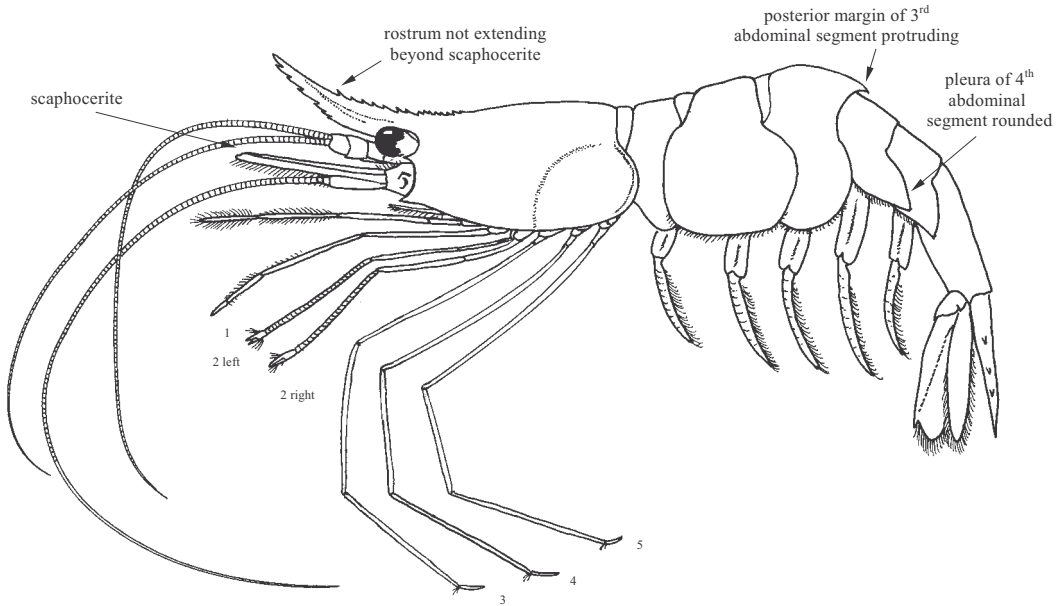
**Distribution:** Eastern Atlantic: Madeira, Canary Islands, Cape Verde Islands and along the Moroccan coast. Indo-West Pacific: South Africa and the Arabian Sea to the Malay Archipelago and Hawaii.



***Plesionika* aff. *acanthonotus* (S.I. Smith, 1882)**

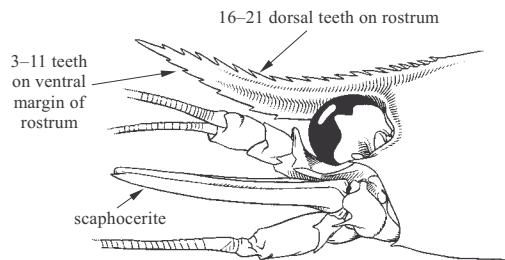
**Frequent synonyms / misidentifications:** None / None.

**FAO names:** **En** – Lesser striped shrimp; **Fr** – Crevette naine rayée; **Sp** – Camarón rayado menor.



**Diagnostic characters:** Rostrum not extending beyond distal edge of scaphocerite, armed dorsally throughout length with 13 to 21 teeth, including 3 to 8 on carapace directly above or posterior to orbital margin, 3 to 7 posteriormost teeth movable, none with barbed tips, armed ventrally with 3 to 11 teeth, proximal part of ventral lamina expanded; orbital margin convex ventrally,

nearly vertical posteriorly with rim of short slender setae; carapace covered with scales, usually scales lost leaving a pitted surface. Eyes one-third to one-fourth of postorbital carapace length, **ocellus absent**. Third abdominal segment with posterior margin slightly protruding, with indistinct posterior median dorsal carina, **fourth segment with pleuron rounded, without marginal denticle**, fifth segment with posteroventral tooth on pleuron, sixth somite about twice as long as fifth, about twice as long as maximum height; telson about 1.2 times longer than sixth abdominal somite, with 4 or 5 pairs of dorsolateral spines, including pair adjacent to lateral pair of posterior spines. Stylocerite broadly acute, reaching level of dorsal arc of distal margin of basal antennular segment. Scaphocerite about 3.6 times longer than wide, distolateral tooth as long as lamina or just falling short of it. Third maxilliped with epipod, usually extending with distal half of terminal segment beyond scaphocerite; in larger specimens it reaches with its ultimate segment and distal part of penultimate segment beyond scaphocerite; penultimate segment about 1.2 times longer than ultimate segment. First leg slightly longer than third maxilliped, chela shorter than ultimate segment of third maxilliped. **Anterior 4 legs with epipods; carpus of second pair (sub)equal**, with 21 carpal segments; dactylus and distal half of propodus of third pair usually extending beyond scaphocerite, extending beyond scaphocerite with dactylus, propodus and larger part of carpus in larger specimens; dactylus about 0.2 times propodus length, accessory distal spine about half as long as unguis. Third pleopod with exopod about half as long as carapace. **Colour:** reddish brown to bluish, rostrum, tips of pereopods and margins of tail fan blue. Females with dark orange eggs.



**Size:** Maximum total length 8.4 cm.

**Habitat, biology, and fisheries:** Occurring in depths between 190 and 1 350 m (most commonly between 190 and 325 m) on muddy bottoms. The interest to fisheries is minor. Forms a minor portion of the catch in the Mediterranean. Marketed in small quantities, mixed with other shrimps, in the Mediterranean especially the Catalan coast of Spain and the Balears. In the western Atlantic taken in industrial trawl fisheries together with species of the genus *Penaeus*. Marketed there locally, fresh or frozen.

**Distribution:** Eastern Atlantic: Bay of Biscay to Namibia; Western Mediterranean, including Corsica, Sardinia and Sicily, also found on the coasts of Calabria, Italy and Montenegro, (former Yugoslavia). Western Atlantic: South Carolina, USA, south to Brazil.

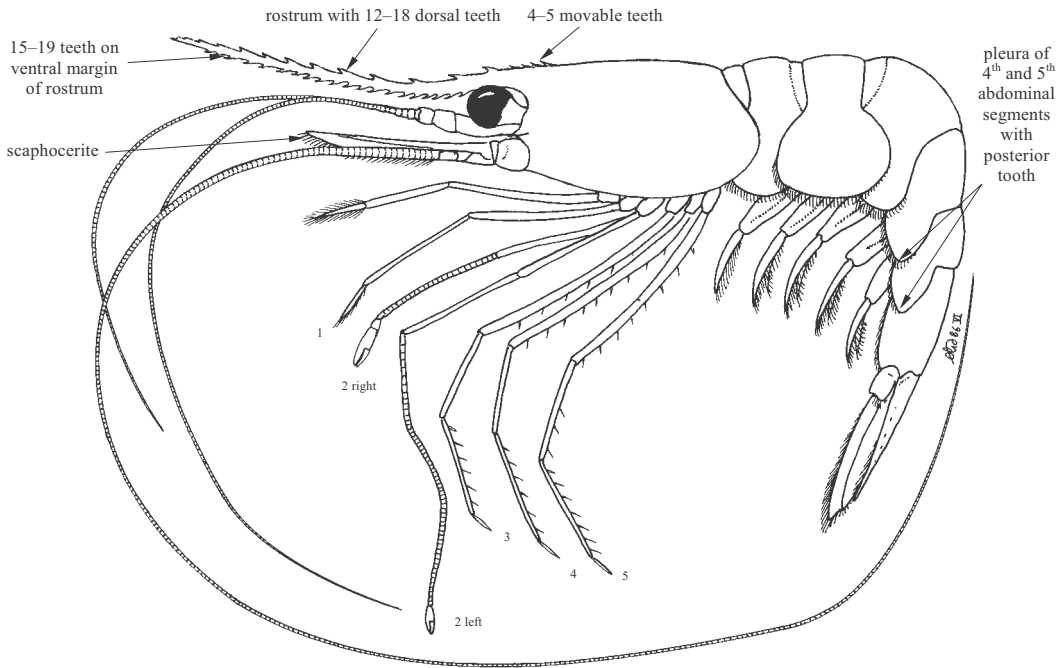
**Remarks:** The east Atlantic population seems to be different from the west Atlantic population and should probably be regarded a different species.



*Plesionika antigai* Zariquiey Alvarez, 1955

**Frequent synonyms / misidentifications:** None / *Plesionika heterocarpus* (Costa, 1871).

**FAO names:** **En** – Catolonian striped shrimp; **Fr** – Crevette catalane; **Sp** – Camarón catalán.



**Diagnostic characters:** Rostrum extending far beyond antennal scale, armed dorsally throughout length with 12 to 18 teeth, including 4 or 5 movable teeth positioned behind the orbit; armed ventrally with 15 to 19 teeth. Third abdominal segment with blunt posterior carina, without posteromesial tooth, fourth and fifth segments with posteroventral tooth on pleuron, sixth segment 1.6 times as long as fifth; telson 1.25 times as long as sixth segment, with 4 pairs of dorsolateral spinules, including pair adjacent to lateral pair of posterior spines. Eye with maximum diameter about one-fifth of carapace length, ocellus longitudinally oval, slightly constricted at juncture with cornea. Stylocerite acute, not extending beyond dorsal arc of distal margin of first antennular segment. Antennal scale with distolateral tooth falling slightly short of distal margin of blade. Third maxilliped with well-developed strap-like epipod, penultimate segment subequal to terminal segment. **Anterior 4 legs with well-developed strap-like epipods. Second pair distinctly unequal; left leg much larger than right, overreaching scaphocerite with chela and carpus**, with 92 to 116 carpal segments, 48 to 62 meral segments and 8 ischial segments; right leg extending beyond scaphocerite with fingers of chela only, carpus with 18 to 24 segments, merus with 3 to 7 segments and ischium not divided. Third pair extending beyond antennal scale by lengths of dactylus and distal half of propodus; **dactylus slightly less than third of propodus length**, corpus with several rows of short slender setae in distal third; accessory distal spine almost as long as unguis. **Colour:** with parallel oblique red stripes on carapace extending to the third and fourth abdominal segments; dactyli of the pereopods reddish.

**Size:** Maximum total length 7 cm.



**Habitat, biology, and fisheries:** Occurring at depths between 120 and 800 m (most commonly between 330 and 370 m) on muddy bottoms. Interest to fisheries is minor, if at all. Caught by trawlers off the Catalanian coast of Spain and brought to the fish markets, where it is sold as an admixture with other prawns.

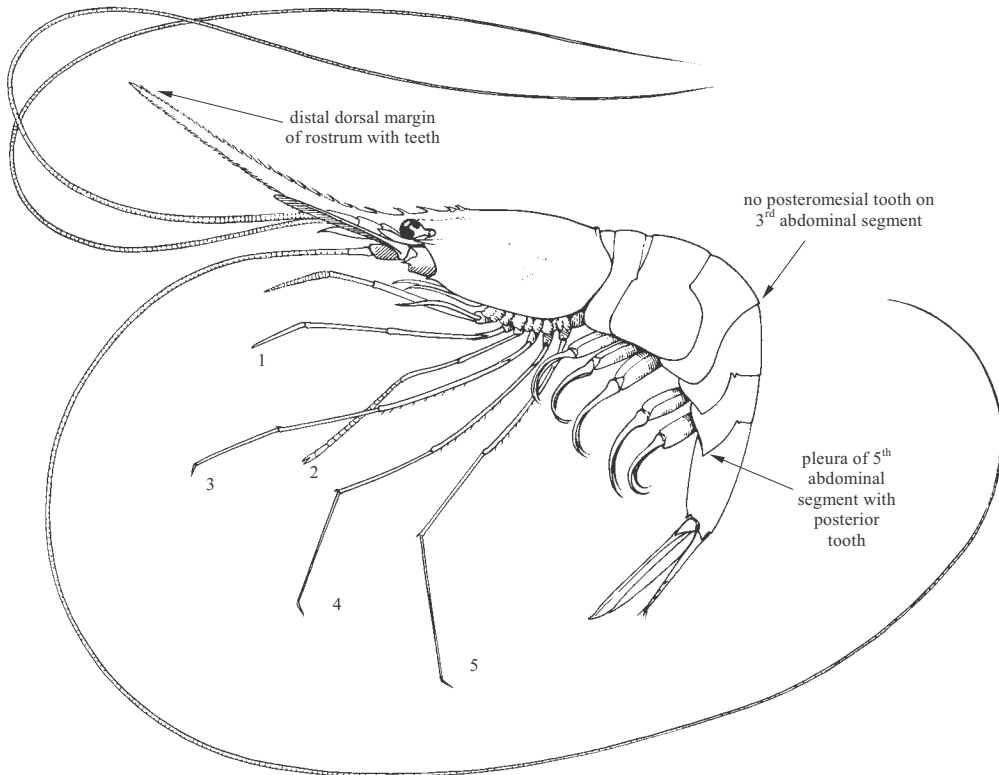
**Distribution:** Eastern Atlantic: Morocco, Mauritania, Canary Islands; western Mediterranean, including Tunisia, Sicily and the west coast of Italy.



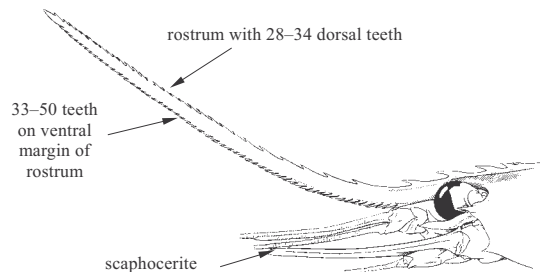
***Plesionika edwardsii* (Brandt, 1851)**

**Frequent synonyms / misidentifications:** None / *Pandalus narval* (Fabricius, 1787) and *Parapandalus narval* (Fabricius, 1787).

**FAO names:** **En** – Striped soldier shrimp; **Fr** – Crevette édouard; **Sp** – Camarón soldado rayado.



**Diagnostic characters:** Rostrum extending far beyond distal margin of antennal scale, more than twice carapace length, armed dorsally throughout length with 28 to 34 teeth, including 1 to 3 on carapace posterior to level of orbital margin, none movable or with barbed tips, armed ventrally with 33 to 50 teeth. Abdomen without posteromesial tooth or median dorsal carina on third segment, fourth segment with pleuron rounded, without marginal denticle, fifth segment with posteroventral tooth on pleuron, sixth segment 1.75 to nearly twice as long as maximum height; telson subequal to sixth segment in length, with 4 pairs of dorsolateral spinules, including pair adjacent to lateral pair of posterior spines. Eye with maximum diameter about one-fifth of carapace length, ocellus longitudinally oval, slightly constricted at juncture with cornea. Stylocerite acute, barely extending beyond dorsal arc of distal margin of first antennular segment; antennal scale 4.8 to 5.5 times as long as wide, distolateral tooth falling slightly short or slightly overreaching level of distal margin of blade. Third maxilliped with minute epipod, penultimate segment subequal to terminal segment; **legs with reduced, inconspicuous epipods on 4 anterior pairs; second pair (sub)equal**, with 21 to 25 carpal segments; third pair extending beyond antennal



scale by little more than lengths of dactyl and propodus, accessory distal spine about half as long as and well separated from main terminal spine, 3 distal segments, combined, about 1.5 times as long as carapace, none of pereopods extremely slender or thread-like. **Colour:** reddish carapace and appendages; abdomen with longitudinal red stripes; eggs blue.

**Size:** Maximum total length 16.6 cm, normally 8 to 12 cm.

**Habitat, biology, and fisheries:** Occurring at depths between 50 and 690 m (most common between 250 and 380 m). Living on muddy bottoms, also recorded among the coral *Dendrophyllum*. Of some importance in trawl fisheries along the Atlantic coast of Spain and Morocco. Caught by traps in the Azores and the Canary Islands where its fishery potential is being studied. Of importance to fisheries in the western Mediterranean; trawled commercially along the Spanish, Italian, Algerian and Tunisian coasts. The species is recorded from exploratory fisheries off the Guianas, in the western Atlantic where it is also taken in industrial trawl fisheries. Marketed fresh, frozen, or conserved.

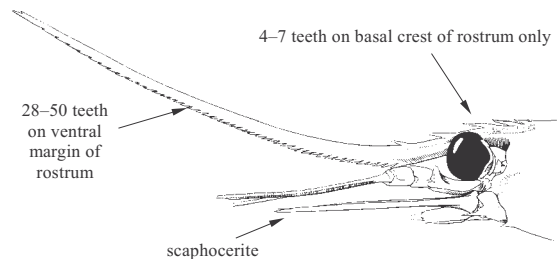
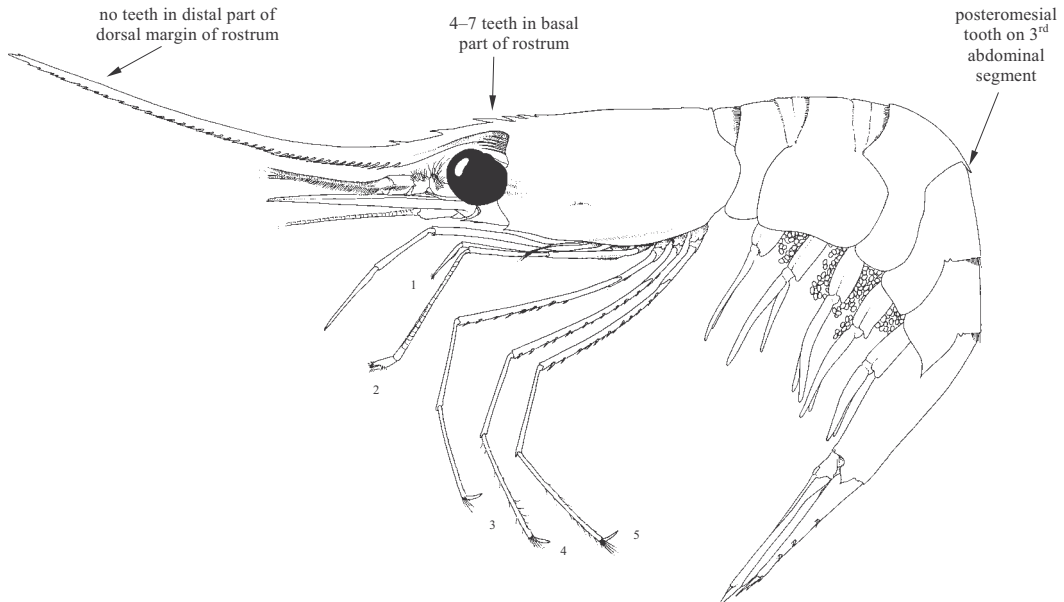
**Distribution:** Eastern Atlantic: from northwest Spain south to Sierra Leone (some records as far south as Angola); Mediterranean, except the Adriatic and the Black Seas. Western Atlantic: South Carolina, USA, Bahamas, Cuba west to Gulf of Mexico, south to Suriname, including the Antilles. Also recorded from the Red Sea and Indian Ocean and Indo-West Pacific, as far as Indonesia and the Philippines.



*Plesionika ensis* (A. Milne Edwards, 1881)

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

**FAO names:** **En** – Striped gladiator shrimp; **Fr** – Crevette gladiateur rayée; **Sp** – Camarón gladiator rayado.



**Diagnostic characters:** Rostrum reaching far beyond distal margin of antennal scale, curved upward, more than twice as long as postorbital carapace length, **armed dorsally with 4 to 7 (usually 5) teeth, including 2 or 3 on carapace posterior to level of orbital margin, posteriormost tooth smallest**, with incomplete basal suture,

with 1 subdistal tooth, **otherwise without dorsal teeth anterior to level of distal end of antennular peduncle**, none with barbed tips, **armed ventrally with 28 to 50 teeth**; orbital margin convex in ventral part, nearly vertically convex in dorsal half with row of 5 very long setae; **third abdominal segment with posteromesial tooth**, fourth segment with pleuron rounded, fifth segment with strong posteroventral tooth on pleuron, sixth segment more than twice length of fifth segment, 2.5 to 2.7 times as long as maximum height; telson 0.8 of length of sixth abdominal segment, with 4 pairs of dorsolateral spines, including pair adjacent to lateral pair of posterior spines. Eye with maximum diameter nearly one-third of carapace length, ocellus subcircular, somewhat constricted at juncture with cornea; stylocerite broadly acute, reaching level of dorsal arc of distal margin of basal antennular segment; scaphocerite 5 to 7 times as long as wide, distolateral tooth distinctly extending beyond distal margin of lamina; third maxilliped with epipod, penultimate segment slightly longer than terminal segment; **legs with well-developed epipods on 4 anterior pairs, second pair subequal**, with 14 to 20 carpal segments, third pair reaches beyond distal margin of antennal scale by lengths of dactylus and distal half of propodus, dactylus short, laterally compressed, 0.20 to 0.25 times length of propodus, accessory distal spines about third length of unguis, 3 distal segments, combined, about as long as carapace; none of legs extremely slender or thread-like;

third pleopod with exopod usually slightly less or slightly more than half as long as carapace. **Colour:** reddish carapace and appendages; abdomen with dark red transverse bands; eggs dark blue.

**Size:** Maximum total length 12.8 cm (female).

**Habitat, biology, and fisheries:** Occurring at depths between 100 and 1 250 m, most commonly between 230 and 730 m on muddy bottoms. Of potential importance to fisheries along the west African coast. Caught in experimental trap fisheries in the Canary Islands. In the western Atlantic it is taken in industrial trawl fisheries, but no data on its commercial value there are available. Probably marketed locally together with other species.

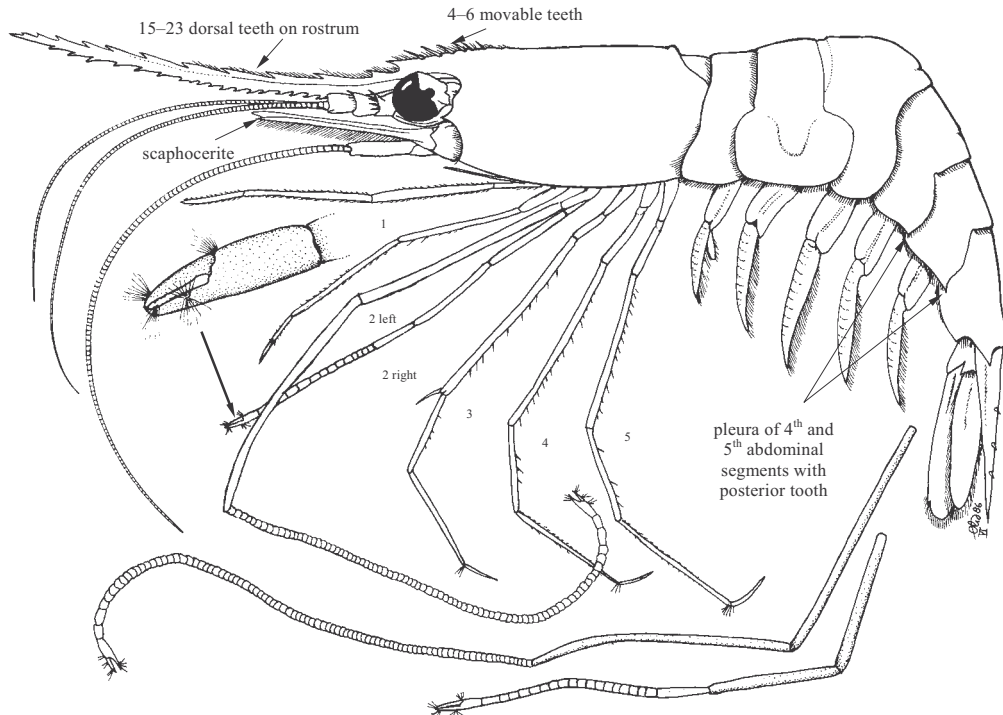
**Distribution:** Eastern Atlantic: from southwest Spain along the west African coast south to Angola, also recorded from Madeira, the Canary Islands and the Cape Verde Islands; western Mediterranean.



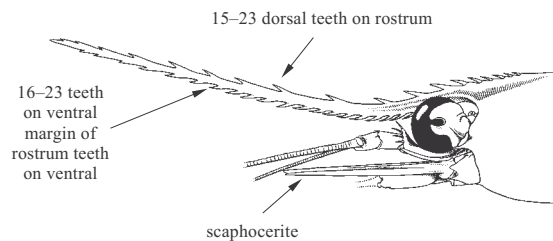
*Plesionika heterocarpus* (Costa, 1871)

Frequent synonyms / misidentifications: None / None.

FAO names: **En** – Arrow shrimp; **Fr** – Crevette flèche; **Sp** – Camarón flecha.



**Diagnostic characters:** Rostrum long, about two times as long as scaphocerite, slender and slightly curved upward; dorsal margin with 15 to 23 teeth of which the proximal 4 to 6 are movable and situated behind the orbit; the ventral margin bears 16 to 23 teeth. Third abdominal segment with blunt posterior carina, without posteromesial tooth, fourth and fifth segments with posteroventral tooth on pleuron, sixth segment about 1.7 times as long as fifth; telson 1.25 times as long as sixth segment, with 4 pairs of dorsolateral spinules, including pair adjacent to lateral pair of posterior spines. Eye with maximum diameter about one-fifth of carapace length, ocellus longitudinally oval, constricted at juncture with cornea. Stylocerite acute, reaching dorsal arc of distal margin of first antennular segment. Antennal scale with distolateral tooth falling short of distal margin of blade. Third maxilliped with well-developed strap-like epipod, penultimate segment subequal to terminal segment. Anterior 4 legs with well-developed strap-like epipods. **Second pair distinctly unequal; left leg much longer than right, overreaching scaphocerite with chela, carpus and distal half of merus, with 107 to 215 carpal segments, 88 to 111 meral segments and about 25 ischial segments;** right leg extending beyond distal margin of scaphocerite with chela and distal half to third of carpus, carpus with 20 to 33 segments, merus with 6 to 15 segments and ischium with about 10 segments. Third pair overreaching antennal scale by lengths of dactylus and distal half of propodus; **dactylus subspatulate, long, about 0.4 of propodus length,** carpus with several rows of short slender setae in distal half; accessory distal spine about half as



long as sixth segment, with 4 pairs of dorsolateral spinules, including pair adjacent to lateral pair of posterior spines. Eye with maximum diameter about one-fifth of carapace length, ocellus longitudinally oval, constricted at juncture with cornea. Stylocerite acute, reaching dorsal arc of distal margin of first antennular segment. Antennal scale with distolateral tooth falling short of distal margin of blade. Third maxilliped with well-developed strap-like epipod, penultimate segment subequal to terminal segment. Anterior 4 legs with well-developed strap-like epipods. **Second pair distinctly unequal; left leg much longer than right, overreaching scaphocerite with chela, carpus and distal half of merus, with 107 to 215 carpal segments, 88 to 111 meral segments and about 25 ischial segments;** right leg extending beyond distal margin of scaphocerite with chela and distal half to third of carpus, carpus with 20 to 33 segments, merus with 6 to 15 segments and ischium with about 10 segments. Third pair overreaching antennal scale by lengths of dactylus and distal half of propodus; **dactylus subspatulate, long, about 0.4 of propodus length,** carpus with several rows of short slender setae in distal half; accessory distal spine about half as

long as unguis, both minute. **Colour:** red to pinkish. Adults have luminescent bluish green chromatophores along the anterior margins of the pleura of the second to fourth abdominal segments. There is a red spot on the upper part of the fourth abdominal segment. The dactyli of the pereopods are white.

**Size:** Maximum total length 8.8 cm (male), 10.6 cm (female), most commonly between 5 and 8 cm.

**Habitat, biology, and fisheries:** Occurring at depths between 35 and 850 m (most commonly between 150 and 400 m) on muddy bottoms. Ovigerous females are found throughout the year (Spain and Tunisia). Of minor interest to fisheries. Found regularly in the markets of Spain and northern Italy, but only occasionally in those of Morocco, Tunisia, Greece and Sicily. Usually sold as admixtures with other species of shrimps. In Algeria this species is more abundantly caught (20 to 80 kg/h), but apparently not consumed in that country.

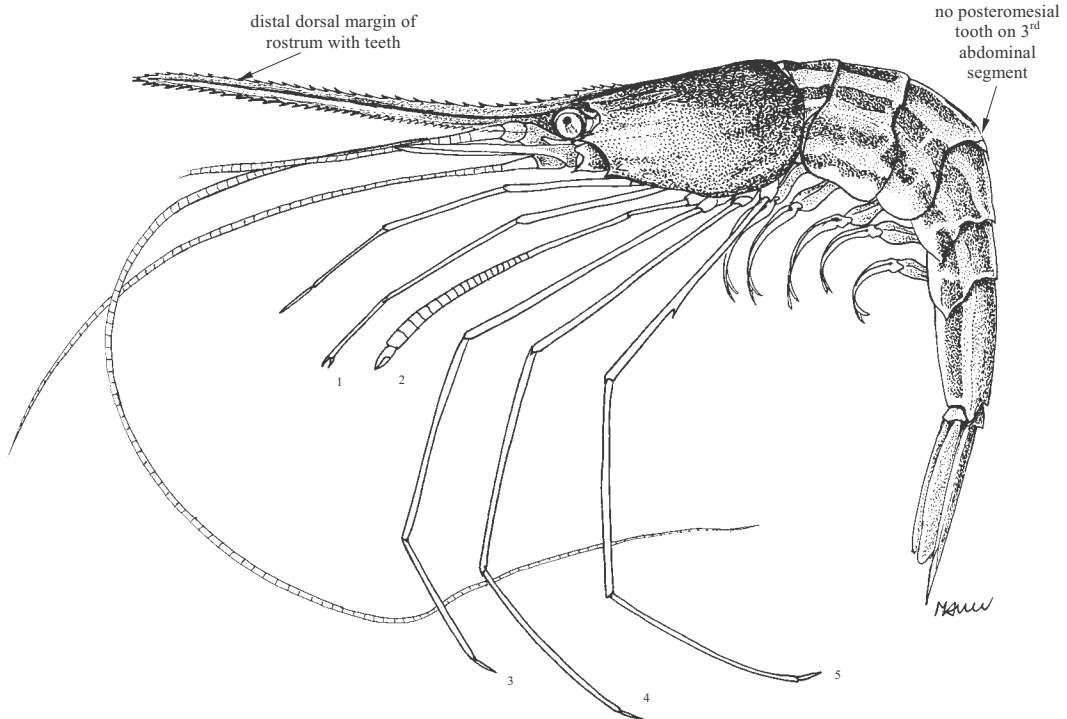
**Distribution:** Eastern Atlantic: from Portugal to Angola; Mediterranean, except the northern part of the Adriatic Sea and the Black Sea.



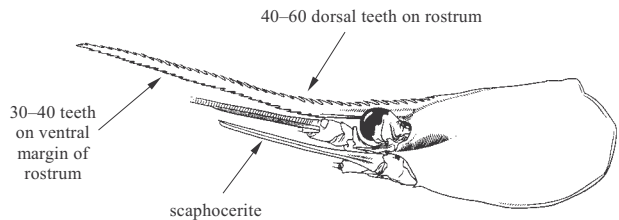
***Plesionika longicauda* (Rathbun, 1901)**

**Frequent synonyms / misidentifications:** *Parapandalus longicauda* (Rathbun, 1901) / *Plesionika narval* (Fabricius, 1787); *P. escatilis* (Stimpson, 1860).

**FAO names:** **En** – Longtail shrimp; **Fr** – Crevette queue longue; **Sp** – Camarón coludo.



**Diagnostic characters:** Rostrum long and slender, curved upward, almost twice as long as carapace, **armed dorsally throughout length with 40 to 60 very small teeth**, including 4 to 8 on carapace posterior to level of orbital margin, armed ventrally with 30 to 40 very small teeth. Abdomen without posteromesial tooth or median dorsal carina on third segment, fourth segment with pleuron rounded, without marginal denticle, fifth segment with pleuron tapering to strong posteroventral tooth, sixth somite nearly as long as to fully 1.25 times as long as maximum height, about twice as long of fifth segment; telson usually shorter than sixth segment, with 4 pairs of dorsolateral spinules, including pair adjacent to lateral pair of posterior spines. Eye with maximum diameter about one-fourth of carapace length, ocellus subcircular or transversely oval, in broad contact with cornea. Stylocerite broadly acute, hardly reaching level of dorsal arc of distal margin of first antennular segment. Scaphocerite with distolateral tooth typically extending beyond distal margin of blade. **Epipod absent or rudimentary at third maxilliped**; terminal segment of third maxilliped never shorter than penultimate segment. Second pair of legs with 20 to 25 carpal articles; **legs very slender, none of them with epipods**. Third pair extending beyond distal margin of scaphocerite by lengths of dactylus, propodus and slightly more or less than length of carpus, dactyl about one-tenth as long as





propodus, accessory distal spine somewhat divergent from main terminal spine, not extending beyond basal one-fourth. Third pleopod with exopod one-half to three-fifth as long as carapace.

**Colour:** carapace with red longitudinal lines dorsally, reddish laterally; abdomen with moderately broad bright red longitudinal lines alternated by rows of white chromatophores; anterior appendages and rostrum reddish; pereopods with red and white bands; pleopods red; eggs orange.

**Size:** Maximum total length greater than 8 cm.

**Habitat, biology, and fisheries:** Occurring on soft bottoms at depths between 55 and 500 m. Appears to live in shoals. Of potential interest to fisheries. Recorded in fish trawl hauls of 57 kg/h off Guinea-Bissau. Taken in industrial trawl fisheries off Suriname. No data on its commercial value are available.

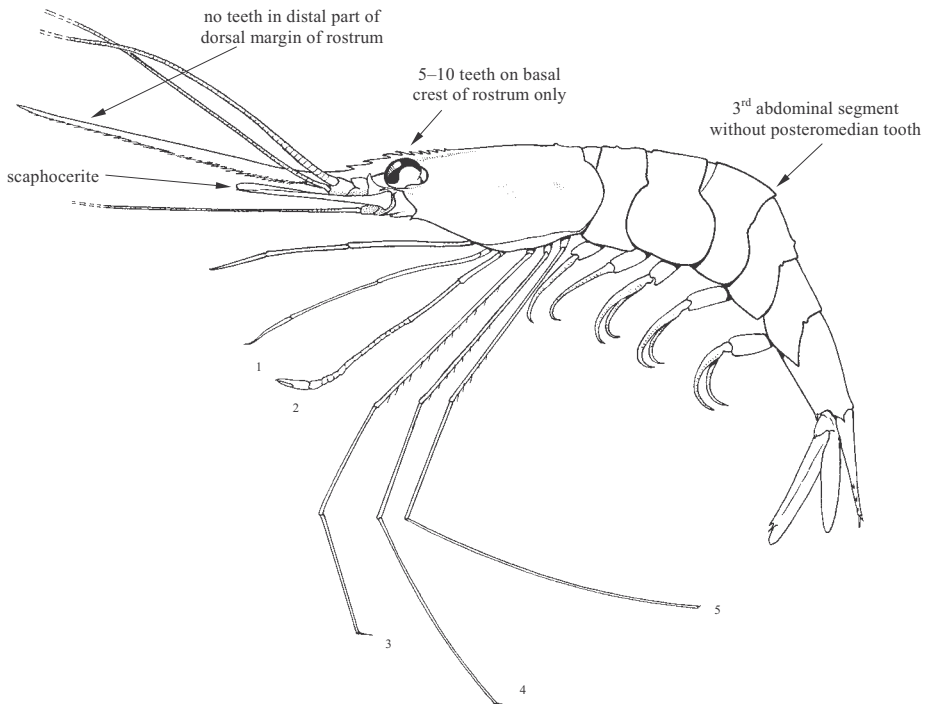
**Distribution:** Eastern Atlantic: southern Senegal to Angola. Western Atlantic: Gulf of Mexico, Caribbean Sea and coasts of the Guianas.



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

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

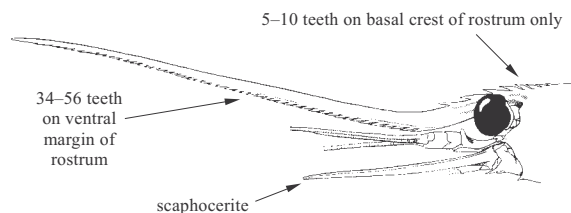
**FAO names:** **En** – Golden shrimp; **Fr** – Crevette dorée; **Sp** – Camarón de oro.



**Diagnostic characters:** Rostrum far extending beyond scaphocerite, **armed dorsally, on basal crest only**, with 5 to 10 (usually 7 or 8) teeth, including 2 to 5 on carapace posterior to level of orbital margin, none with distinct basal sutures or barbed tips, armed ventrally with 34 to 56 teeth.

**Abdomen without posteromesial**

**tooth or median dorsal carina on third segment**, none of abdominal pleura with distinct marginal tooth or denticle, sixth segment about twice as long as maximum height; telson from subequal to 1.25 times as long as sixth segment, with 4 pairs of dorsolateral spinules, including pair adjacent to lateral pair of posterior spines. Eye with maximum diameter usually slightly longer than one-fourth of carapace length, ocellus represented by tapering, subtruncate lobe, broadening rather than constricted at juncture with cornea. Stylocerite bluntly acute, slightly overreaching dorsal arc of distal margin of first antennular segment. Antennal scale with distolateral tooth reaching at most to distal margin of blade. Third maxilliped with epipod, penultimate segment from 1.15 to more than 1.4 times as long as terminal segment; **legs with epipods on 4 anterior pairs**; **second pair subequal**, with 18 to 36 carpal segments; third pair overreaching scaphocerite by lengths of dactylus, propodus and most of carpus, dactylus from one-seventh to nearly two-fifth as long as propodus, accessory distal spine short, well separated from main terminal spine and slightly more than one-fourth as long. Third pleopod with exopod nearly 0.75 to 0.9 times as long as carapace. **Colour:** pinkish red; eggs blue.



**Size:** Maximum total length: 17 cm.

**Habitat, biology, and fisheries:** A predominantly benthic species inhabiting muddy bottoms of the continental slope at depths between 300 and 700 m. Spawning takes place from March to November, number of eggs per female about 7 000. Feeds chiefly on crustaceans (Pasiphaeidae, euphausiids) as well as on carrion. Up to now, catches off West Africa have probably been very low and it is doubtful whether the species is sufficiently abundant to sustain a special fishery, although it will doubtless be of value as bycatch in deep-sea shrimp fisheries in that area. Caught with bottom and pelagic trawls. Marketed fresh and frozen.

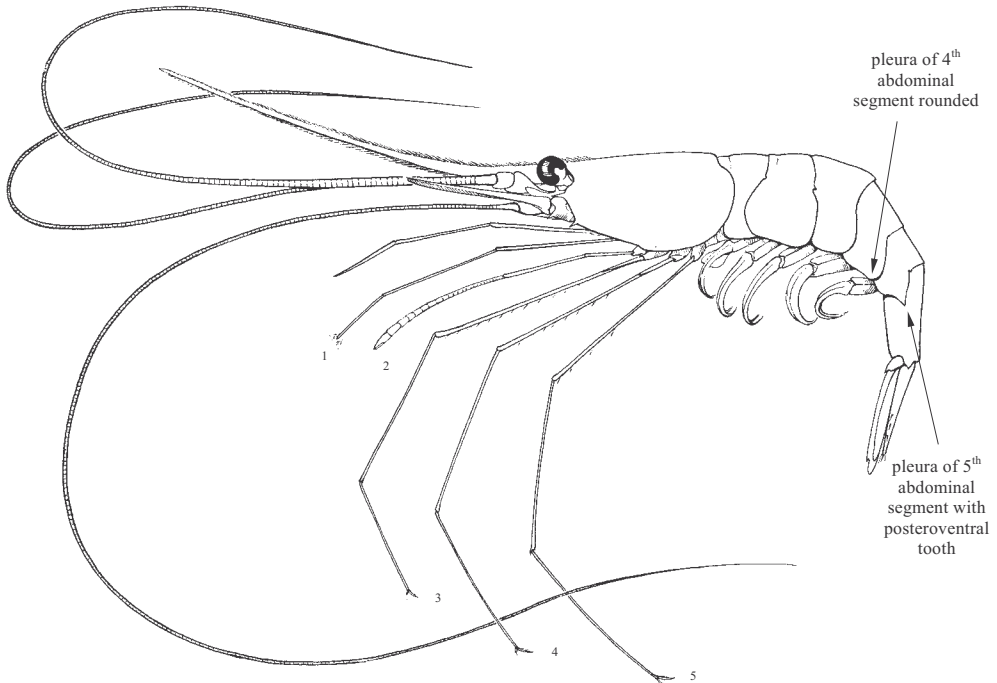
**Distribution:** Throughout the area; northward extending into the Mediterranean and along the Atlantic coasts of Europe up to Ireland, southward to South Africa.



***Plesionika narval*** (Fabricius, 1787)

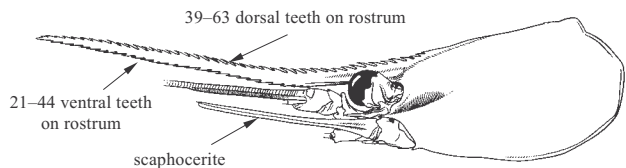
**Frequent synonyms / misidentifications:** *Parapandalus pristis* (Risso, 1816); *P. narval* (Fabricius, 1787) / None.

**FAO names:** En – Narwal shrimp; Fr – Crevette narval; Sp – Camarón narval.



**Diagnostic characters:** Rostrum extending far beyond distal margin of scaphocerite, armed dorsally throughout length with 39 to 63 teeth, including 4 to 7 on carapace posterior to level of orbital margin, only posteriormost tooth with sometimes faint indication of basal

suture, none with barbed tips, armed ventrally with 21 to 44 teeth. Abdomen without posteromesial tooth or median dorsal carina on third segment, fourth segment with pleuron rounded, without marginal denticle, fifth segment with pleuron tapering to strong posteroventral tooth, sixth segment nearly as long as to fully 1.25 times as long as maximum height; telson usually shorter than sixth segment, with 4 pairs of dorsolateral spinules, including pair adjacent to lateral pair of posterior spines. Eye with maximum diameter about one-fourth of carapace length, ocellus subcircular or transversely oval, in broad contact with cornea. Stylocerite broadly acute, hardly reaching level of dorsal arc of distal margin of first antennular segment. Scaphocerite with distolateral tooth typically overreaching distal margin of blade. **Third maxilliped with epipod**, penultimate segment 1.5 to 2.5 times as long as terminal segment; legs without epipods; **second pair subequal, with 22 to 31 carpal articles**; third pair extending beyond scaphocerite by lengths of dactylus, propodus and carpus, dactylus about one-tenth as long as propodus, accessory distal spine not overreaching basal one-fourth of main terminal spine. Third pleopod with exopod one-half to three-fifth as long as carapace. **Colour:** carapace with red longitudinal lines dorsally, reddish laterally; abdomen with moderately broad bright red longitudinal lines alternated by rows of white to yellow chromatophores; anterior appendages and rostrum reddish; pereopods with red and white bands; pleopods red.



**Size:** Maximum total length: 14.5 cm.

**Habitat, biology, and fisheries:** Adults are benthic, inhabiting mud or muddy sand bottoms, often near rocky areas of the continental slope. Although the species may occur between 10 and 900 m, it is most frequently caught between 200 and 400 m. The young seem to lead a rather pelagic life. Spawning takes place during spring, from March to May. This species may be of considerable commercial value since it sometimes forms important concentrations (fish trawl hauls of 57 kg/h off Guinea-Bissau) and also because it can be easily fished with pots. Listed as interesting to fisheries for the Canary Islands. Caught with bottom trawls and traps. Marketed mostly fresh.

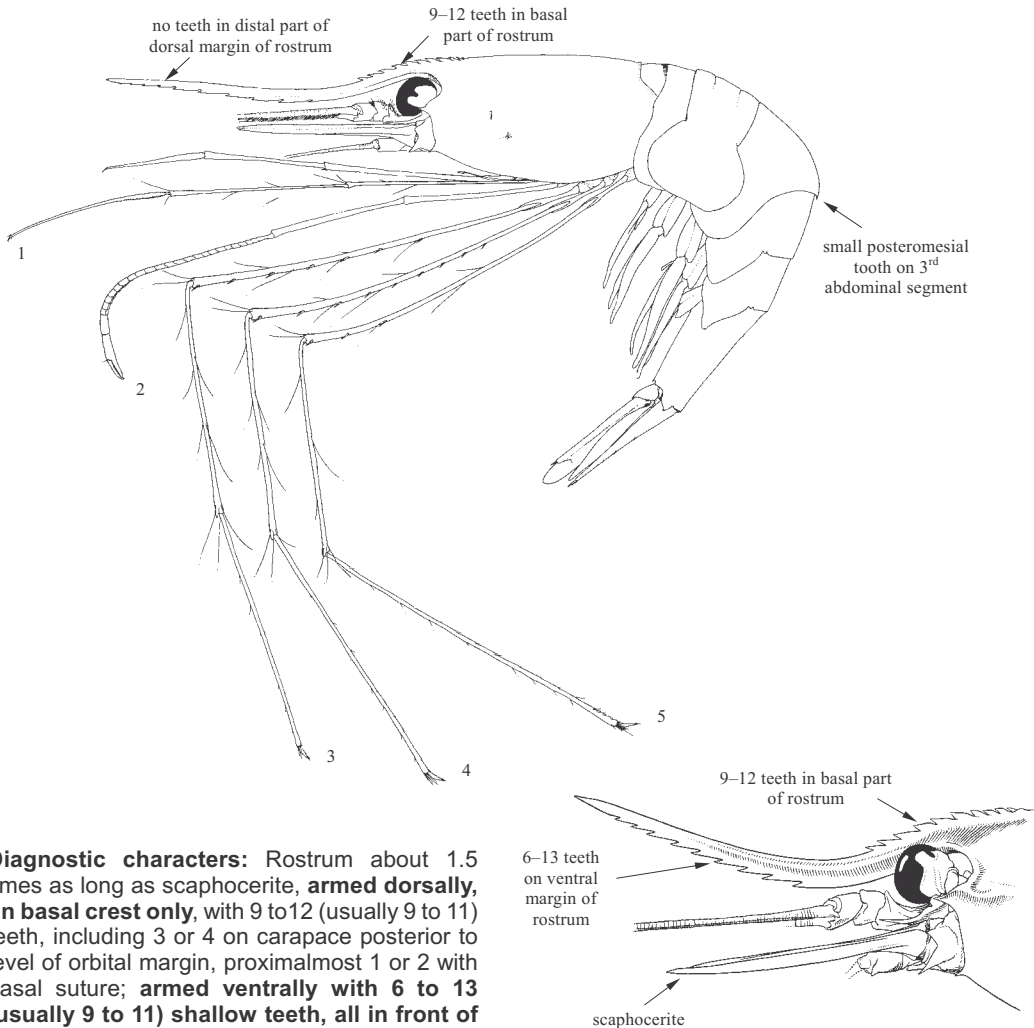
**Distribution:** Eastern Atlantic: West coast of Africa to Angola; Madeira; Canary Islands; Cape Verde Islands. Northward extending into the Mediterranean and to the Azores. Also reported from the Indo-West Pacific.



*Plesionika williamsi* Forest, 1964

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

**FAO names:** En – Guinea striped shrimp; Fr – Crevette rayée guinéenne; Sp – Camarón rayado de Guinea.



**Diagnostic characters:** Rostrum about 1.5 times as long as scaphocerite, **armed dorsally, on basal crest only**, with 9 to 12 (usually 9 to 11) teeth, including 3 or 4 on carapace posterior to level of orbital margin, proximalmost 1 or 2 with basal suture; **armed ventrally with 6 to 13 (usually 9 to 11) shallow teeth, all in front of dorsal teeth.** Abdomen with **small posteromesial tooth, but without median dorsal carina on third segment**, fourth abdominal pleura without marginal tooth, fifth abdominal pleura with distinct marginal tooth; **sixth segment about twice as long as maximum height, about twice as long as fifth**; telson from 1.0 to 1.25 times as long as sixth segment, with 5 pairs of dorsolateral spinules, including pair adjacent to lateral pair of posterior spines. Eye with maximum diameter usually little more than one-fifth of carapace length, ocellus represented by tapering, subtruncate lobe, broadening rather than constricted at juncture with cornea. Stylocerite bluntly acute, not overreaching dorsal arc of distal margin of first antennular segment. Antennal scale with distolateral tooth extending beyond distal margin of blade. Third maxilliped with epipod, penultimate segment about as long as terminal segment; **legs with epipods on 4 anterior pairs; second pair equal**, with 23 to 29 carpal articles; third pair extending beyond scaphocerite by lengths of dactyl, propodus and distal half of carpus, dactylus very short less than 0.1 of propodus length, accessory distal spine short,

about half length of and well separated from unguis. Third pleopod with exopod nearly 0.75 to 0.9 times as long as carapace. **Colour:** abdomen light pink. Carapace and tip of rostrum reddish. Abdomen covered with broad red bands. Eyes dark brown. Distal segments of pereopods somewhat whitish. Eggs blue.

**Size:** Maximum total length 14.6 cm (male), 16.6 cm (female).

**Habitat, biology, and fisheries:** Occurring at depths between 300 and 1 140 m, usually less than 700 m on muddy bottoms. Of potential importance to fisheries because of its abundance, size and quality of the meat. Listed as of potential interest to fisheries for the Canary Islands.

**Distribution:** Eastern Atlantic: West Africa: Guinea, Sierra Leone, Liberia, Côte d'Ivoire, Senegal, Madeira, Canary Islands and Cape Verde Islands. Also recorded from the western Atlantic and Indo-West Pacific.



## Superfamily CRANGONOIDEA

### CRANGONIDAE

#### Crangonid shrimps

**Diagnostic characters:** As in the other families belonging to the infraorder Caridea, the pleura of the second abdominal segment overlap those of first and third segments, and the third pair of pereopods lack pincers. **Body depressed.** Rostrum, if present, generally short. **First pair of pereopods very strong, with incomplete pincers lacking the fixed finger (subchela).**

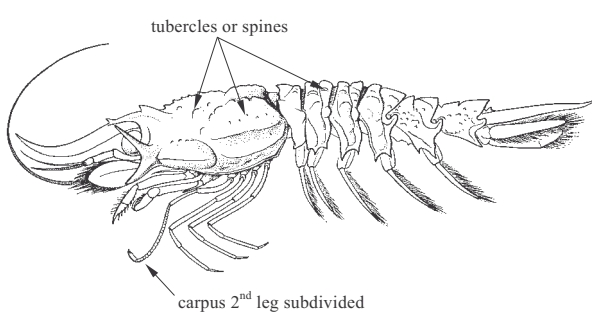
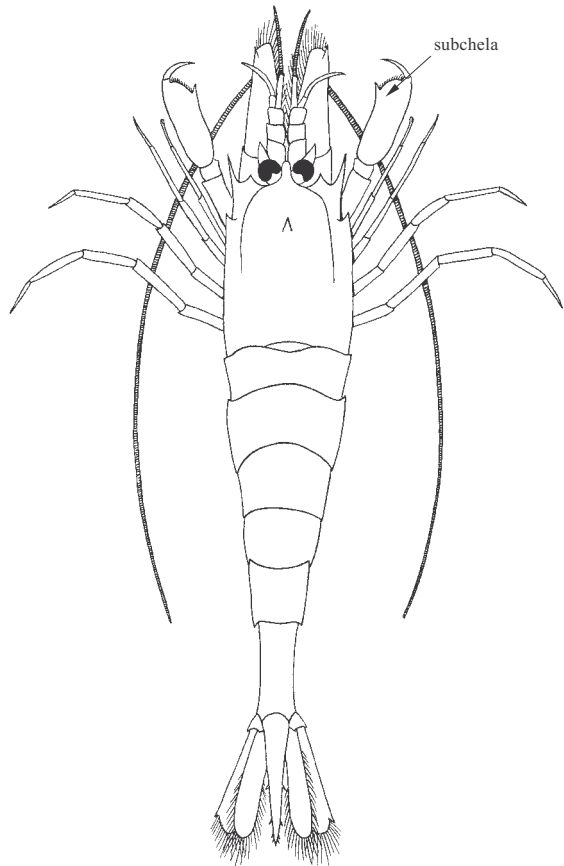
**Habitat, biology, and fisheries:** Tiny to medium-sized shrimps, mostly from shallow waters, but some species occurring in depths well beyond 500 m.

#### Similar families occurring in the area

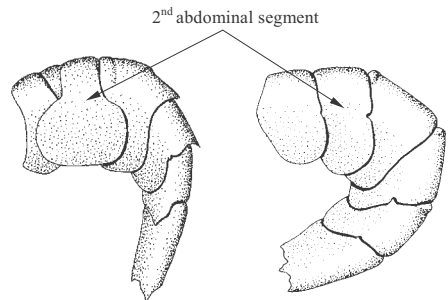
**Glyphocrangonidae:** carapace and abdomen generally covered with small tubercles or spines. Carpus of second legs subdivided.

Other families within the infraorder Caridea: first pair of legs not with subchela. Rostrum usually well developed except in Alpheidae, Ogyridae, Pasiphaeidae and Processidae.

Families of the suborder Dendrobranchiata (Penaeoidea and Sergestoidea) and of the infraorder Stenopodidea: second abdominal pleuron (lateral plate) only overlapping third pleuron, not overlapping first pleuron.



**Glyphocrangonidae**



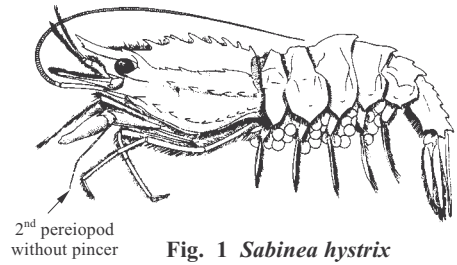
**Caridea**

**Dendrobranchiata,  
Stenopodidea**



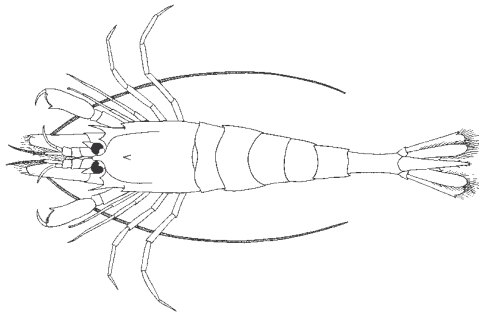
**Key to the genera of Crangonidae occurring in the area**

- 1a. Second pereopods simple, without pincer (Fig. 1) . . . . . **Sabinea**
- 1b. Second pereopods chelate . . . . . → 2
- 2a. Second pereopods subequal in length to other pereopods . . . . . → 3
- 2b. Second pereopods much shorter than other pereopods . . . . . → 4

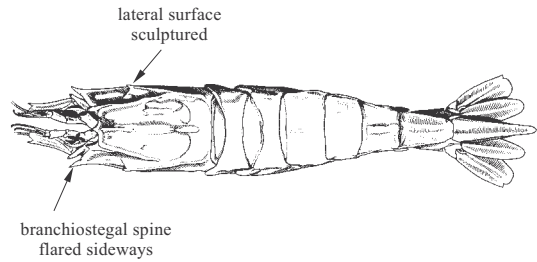


**Fig. 1 *Sabinea hystrix***

- 3a. Integument flexible; lateral surface of abdomen not sculptured; branchiostegal spine not very strong or flared sideways (Fig. 2) . . . . . **Crangon**
- 3b. Integument of carapace and abdomen very thick and strong; lateral surface of carapace distinctly sculptured; branchiostegal spine of carapace very strong and flared sideways (Fig. 3) . . . . . **Metacrangon**

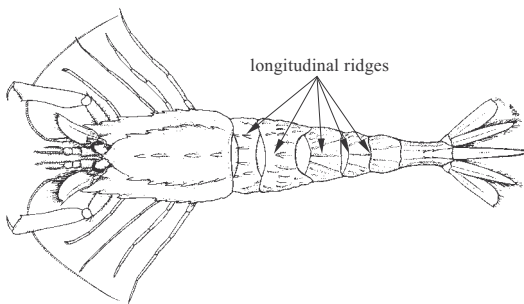


**Fig. 2 *Crangon crangon***

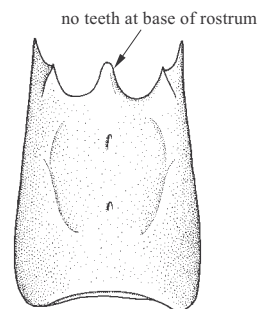


**Fig. 3 *Metacrangon bellmarleyi***

- 4a. Abdomen with longitudinal ridges on all abdominal segments (Fig. 4) . . . . . **Aegaeon**
- 4b. Abdomen without or with at most a median carina on the first and 2 submedian carinae on the fifth and sixth abdominal segments . . . . . → 5
- 5a. Rostrum with a pair of acute small teeth at its base . . . . . → 6
- 5b. Rostrum without lateral teeth (Fig. 5) . . . . . **Philocheras**



**Fig. 4 *Aegaeon lacazei***



**Fig. 5 *Philocheras bispinosus bispinosus***

- 6a. Posterior half of dorsomedian line of carapace with 2 teeth (Fig. 6); lateral surface of carapace with 3 or 5 prominent spines (other than the marginal spines) . . . . . ***Pontophilus***
- 6b. Posterior half of dorsomedian line of carapace with at most a single tooth (Fig. 7); lateral surface of carapace with 1 or 2 prominent spines (other than the marginal ones) . . . . . ***Parapontophilus***

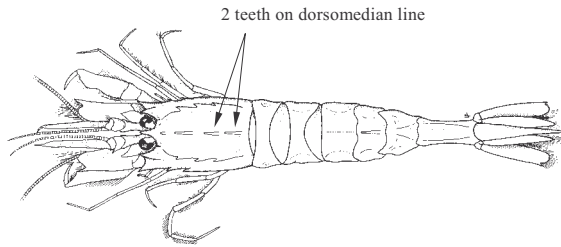


Fig. 6 *Pontophilus spinosus*

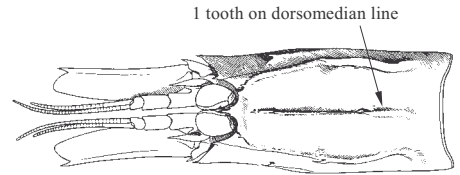
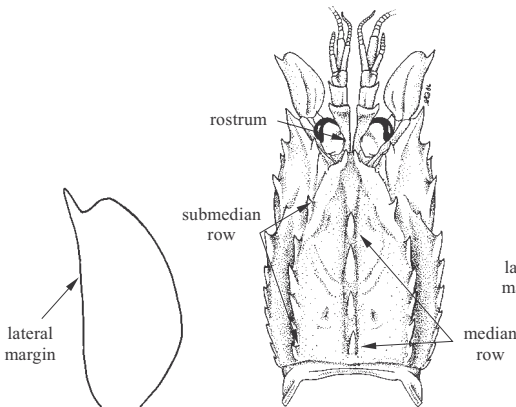


Fig. 7 *Parapontophilus talismani*

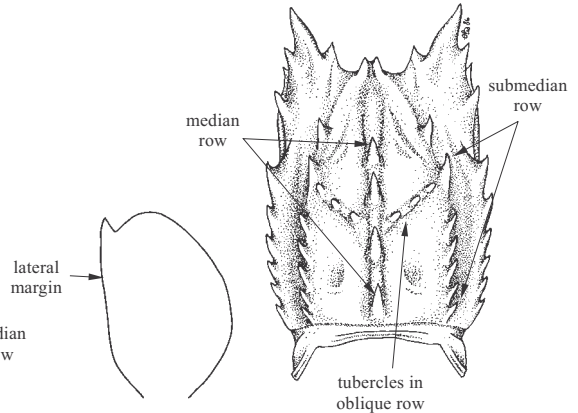
**Key to the species of *Aegaeon* occurring in the area**

- 1a. Scaphocerite more than twice as long as broad with lateral margin concave (Fig. 8a); carapace without tubercles between median and submedian rows (Fig. 8b); second abdominal tergite with dorsal spine; sixth abdominal segment much longer than fifth; deep-water species (200 to 700 m) . . . . . ***Aegaeon lacazei***
- 1b. Scaphocerite less than twice as long as broad with lateral margin convex (Fig. 9a); carapace with 2 or 3 tubercles in oblique row between median and submedian rows (Fig. 9b); second abdominal tergite without dorsal spine; sixth abdominal segment about as long as fifth; shallow-water species (10 to 50 m) . . . . . ***Aegaeon cataphractus***



a) scaphocerite      b) carapace (dorsal view)


Fig. 8 *Aegaeon lacazei*



a) scaphocerite      b) carapace (dorsal view)

Fig. 9 *Aegaeon cataphractus*

**List of species occurring in the area**

The symbol  is given when species accounts are included

- Aegaeon cataphractus* (Olivi, 1792).  
 *Aegaeon lacazei* (Gourret, 1887).  
 *Crangon crangon* (Linnaeus, 1758).  
*Metacrangon bellmarleyi* (Stebbing, 1914).  
*Parapontophilus abyssi* (Smith, 1884).  
*Parapontophilus gracilis* (Smith, 1882).  
*Parapontophilus talismani* (Crosnier and Forest, 1973).  
*Philocheras aglyptus* (Crosnier, 1971).  
*Philocheras bidens* (Holthuis, 1951).  
*Philocheras bispinosus bispinosus* (Hailstone, 1835).  
*Philocheras echinulatus* (M. Sars, 1862).  
*Philocheras fasciatus* (Risso, 1816).  
*Philocheras gaillardi* (Crosnier, 1971).  
*Philocheras opici* (Crosnier, 1971).  
*Philocheras prionolepis* (Holthuis, 1952).  
*Philocheras sculptus* (Bell, 1847).  
*Philocheras trispinosus* (Hailstone in Hailstone and Westwood, 1835).  
*Philocheras wolffi* (Holthuis, 1951).  
 *Pontophilus spinosus* (Leach, 1816).  
*Sabinea hystrix* (A. Milne Edwards, 1881).

**References**

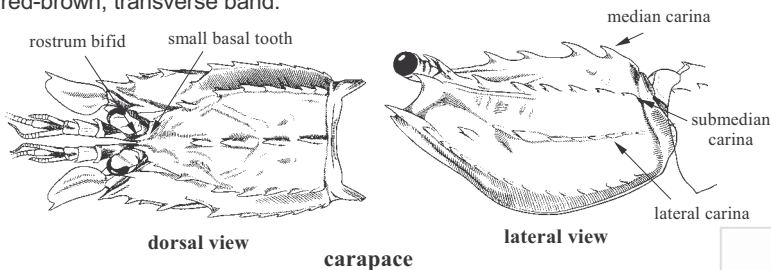
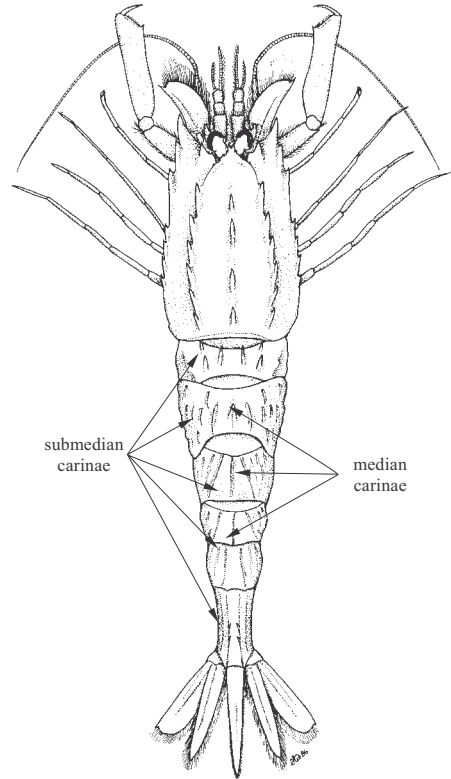
- Crosnier, A. & Forest, J.** 1973. Les crevettes profondes de l'Atlantique oriental tropical. *Faune Tropicale, ORSTOM*, Paris, 19: 1–409, figs 1–121.
- d'Udekem d'Acoz, C.** 1999. *Inventaire et distribution des crustacés décapodes de l'Atlantique nord-oriental, de la Méditerranée et des eaux continentales adjacentes au nord de 25°N*. Muséum National d'Histoire Naturelle, Paris, I–X: 1–383.
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***Aegaeon lacazei* (Gourret, 1887)**

**Frequent synonyms / misidentifications:** *Crangon lacazei* Gourret, 1887; *Pontocaris lacazei* (Gourret, 1887); *P. habereri* Doflein 1902; *Aegeon brendani* Kemp, 1906 / None.

**FAO names:** En – Hardshell shrimp; Fr – Crevette crâne; Sp – Camarón de casco.

**Diagnostic characters:** Small shrimp. Rostrum flat, with 2 submedian teeth giving it a bifid appearance, with pair of small basal teeth; carapace with 5 longitudinal carinae with teeth extending to posterior border; median carina armed typically with 4 teeth of which third, starting anteriorly, largest; no tubercles between median and submedian carina, submedian carina bearing 6 teeth; lateral carina bearing 8 teeth. **Abdominal segments with submedian carinae on all segments; with median carinae on segments 2 to 4; other carinae on abdomen much shorter than median and submedian carinae. Antennal scale almost twice as long as wide; lateral margin concave.** First pereiopods with strong subchela, and with exopods; inferior margin of merus entire. Second pair of pereiopods slender, extending just beyond palm of first pair; dactylus much shorter than palm. Endopods of pleopods 2 to 5 about as long as exopods, males with appendix interna. **Colour:** body varying from yellow to brown, carapace with broad transverse pale or white (in brown specimens) subanterior band. Eyes dark brown. First leg with distal part of palm whitish. Pleopods pale yellow. Tail fan with subanterior part whitish, posterior part a broad, red-brown, transverse band.



**Size:** Maximum total length 5.5 cm, usually between 4 and 5 cm.

**Habitat, biology, and fisheries:** Occurring in depths between 30 and 759 m (most commonly between 200 and 400 m). The interest to fisheries is minor. Caught together with more economically important species in the Mediterranean and brought to Spanish, Italian and occasionally Egyptian markets. Marketed fresh and frozen.

**Distribution:** Eastern Atlantic: from southwestern Ireland to South Africa; western Mediterranean. Indo-West Pacific: East Africa; Kenya; Tanzania; Mozambique; Madagascar; India; Japan, south China Sea; Taiwan Province of China; the Philippines, Indonesia; New South Wales, Australia; New Caledonia; New Zealand; Hawaii.

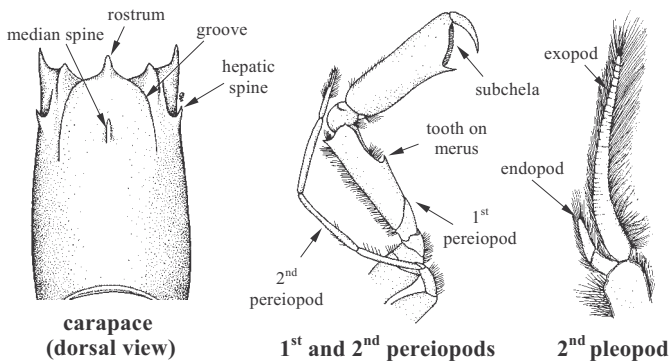
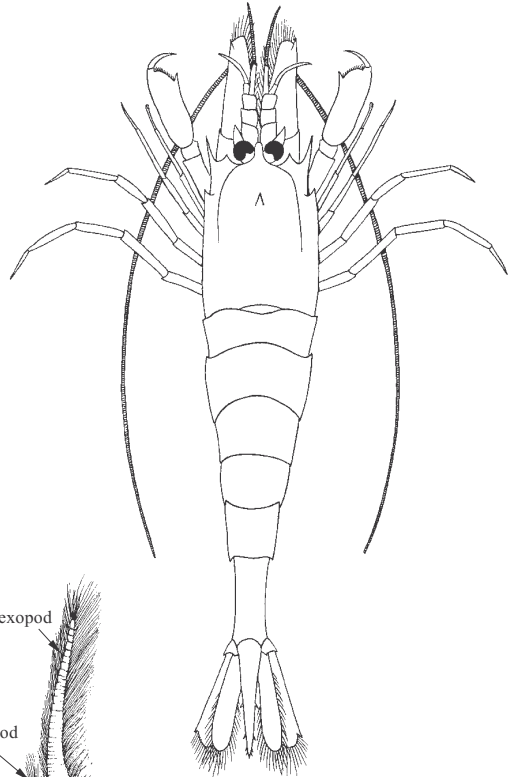


***Crangon crangon* (Linnaeus, 1758)**

**Frequent synonyms / misidentifications:** *Crangon vulgaris* Fabricius, 1798 / None.

**FAO names:** En – Common shrimp; Fr – Crevette grise; Sp – Quisquilla.

**Diagnostic characters:** Body small, depressed (flattened dorsoventrally). Carapace subrectangular, viewed from above, bearing 3 spines (2 hepatic and 1 median) located on transverse line through its anterior fourth; distinct groove running from base of rostrum to middle of carapace; rostrum very short, rather broad at base, rounded at apex, not extending beyond eyes which are short and globular; antennal scale (scaphocerite) with outer margin straight and ending in a strong tooth projecting beyond anterior margin of scale. First pereiopod with subchela; merus of first pair of pereiopods bearing a strong tooth on its inner margin; exopod absent. Second pereiopod slender, reaching midpoint of palm of first pereiopod; chela small, with fingers much shorter than palm. Endopods of second to fifth pleopods much shorter than half length of exopods, consisting of two segments, males without appendix interna. **Colour:** more or less dark uniform grey, sometimes slightly greenish or yellowish, with dark brown dots.



**Size:** Maximum total length 8.9 cm; usually between 5 and 8 cm.

**Habitat, biology, and fisheries:** Usually found on fine sand or slightly muddy sand from the shore to about 50 m depth; within this depth range, the species carries out a seasonal migration. Growth, sexual maturity, spawning and incubation periods are all strongly influenced by temperature and salinity changes and differ considerably from 1 geographic area to another. The number of eggs per female in each spawn varies from 1 500 to 15 000. The species lives five years at most but reaches commercial size after 2 years. Feeds on small benthic organisms (small crustaceans, annelids and molluscs) as well as on discards from the fishery. Caught mainly with bottom trawls. Marketed fresh and cooked/frozen.

**Distribution:** Eastern Atlantic: near estuaries off Morocco, Atlantic coast of Europe north to White Sea; Mediterranean and Black Seas.

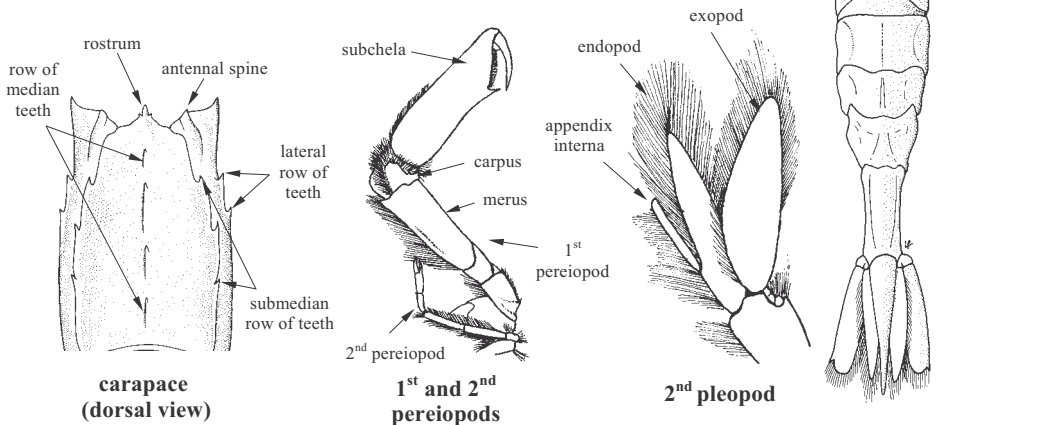


***Pontophilus spinosus* (Leach, 1816)**

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

**FAO names:** En – Spiny shrimp; Fr – Crevette-épine; Sp – Camarón espinudo.

**Diagnostic characters:** Rostrum small, triangular, with a small tooth on both sides. Carapace with a median carina with 4 teeth of which the anteriormost is much smaller than the posterior 3; **submedian carinae with 3 teeth; lateral carinae with only 2 teeth.** Abdomen with carinae on all segments, indistinct on anterior segments, more distinct in posterior ones, especially the 2 submedian carinae on the sixth segment. First pair of pereiopods with small exopod; inferior margin of merus entire. Second pair of pereiopods short, not extending beyond carpus of first pereiopods. Second to fourth pleopods with endo- and exopodites of about the same length; with appendix interna. **Colour:** red-brown marbled, with spots of white-blue on carapace and abdomen.



**Size:** Maximum total length 5.2 cm, usually between 4 and 5 cm.

**Habitat, biology, and fisheries:** Occurring at depths between 20 to 1 550 m (most commonly between 200 and 400 m). The interest to fisheries is minor. Caught together with more economically important species in the Mediterranean and brought to French, Spanish, Italian, Greek and Egyptian markets. Marketed fresh or as bait.

**Distribution:** Eastern Atlantic: from Iceland and northern Norway south to Morocco; Mediterranean Sea (except for the extreme eastern part and the Black Sea).

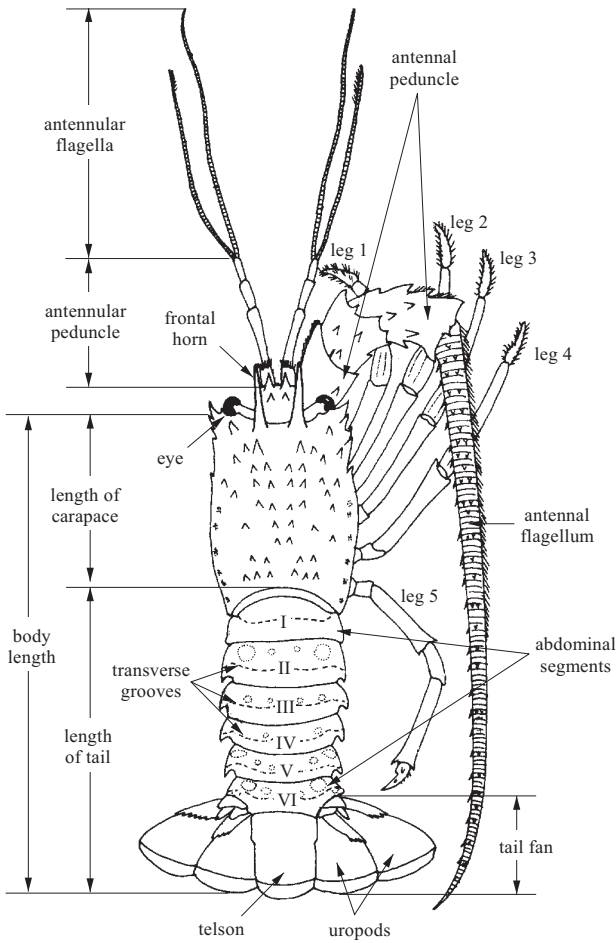


# **LOBSTERS**

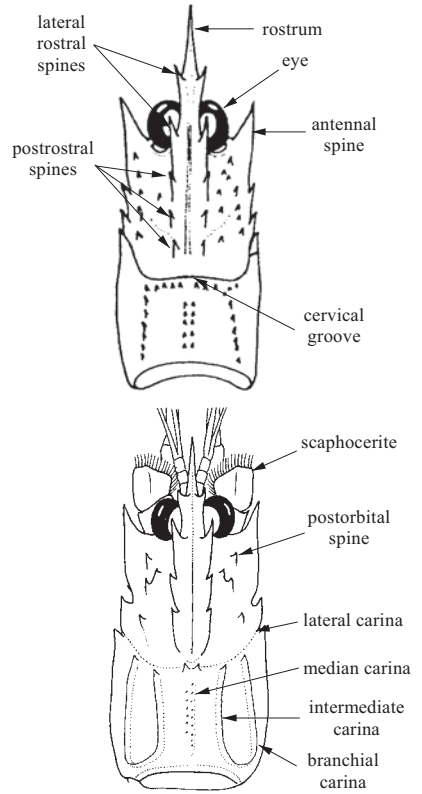
by M.S. Nizinski

National Marine Fisheries Service, National Systematics Laboratory,  
National Museum of Natural History, Washington, DC, USA

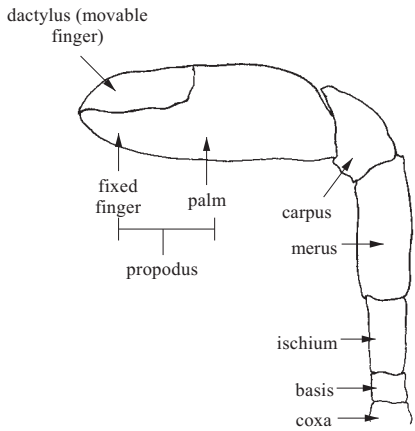
# TECHNICAL TERMS AND MEASUREMENTS



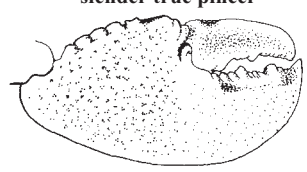
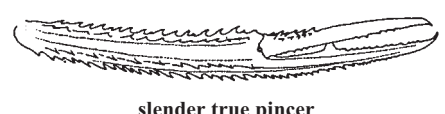
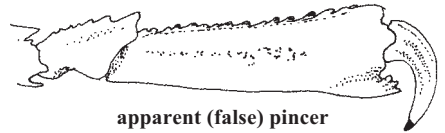
**general body shape (dorsal view)**



**carapace (dorsal view)**

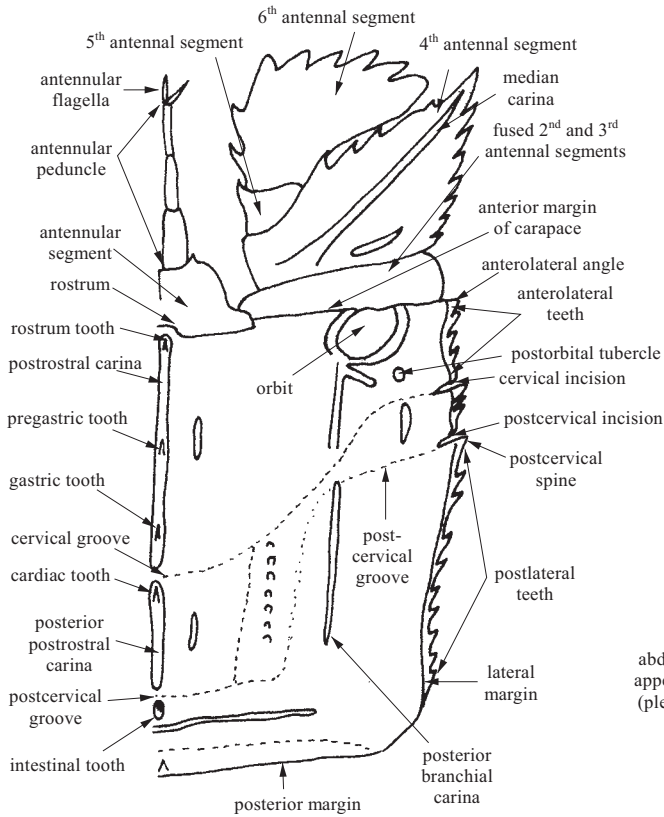


**schematic illustration of a cheliped**

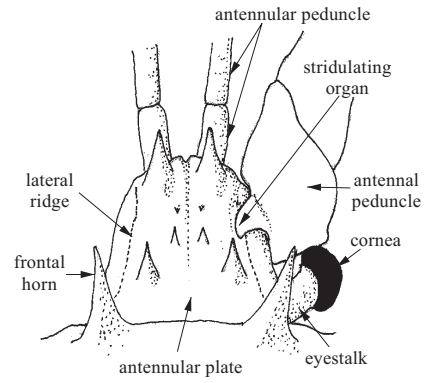


**types of terminal segments in first pair of legs**

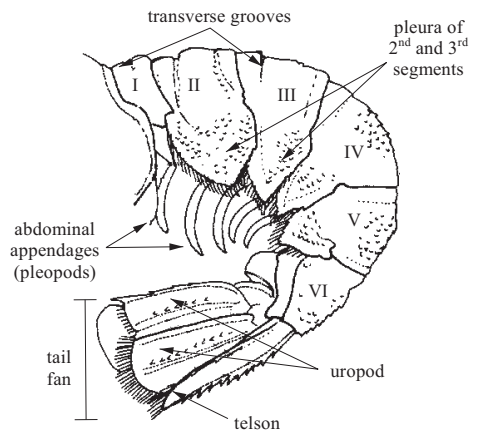




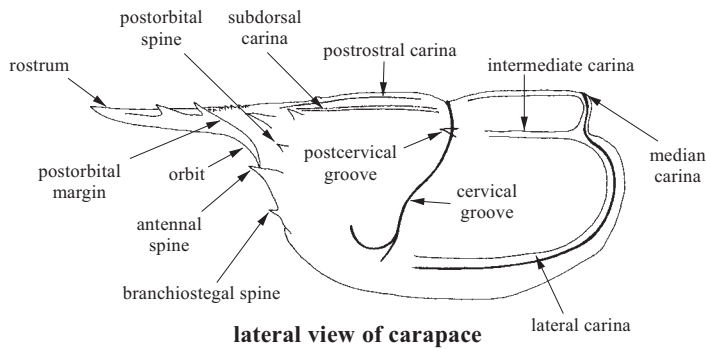
**dorsal view of right half of carapace**



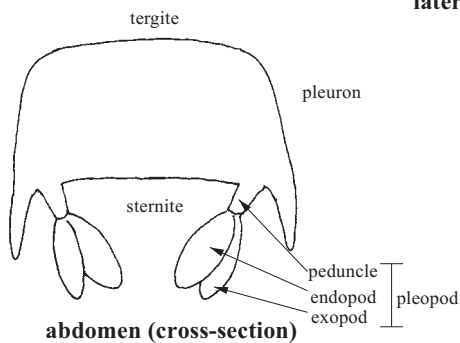
**dorsal view of head**



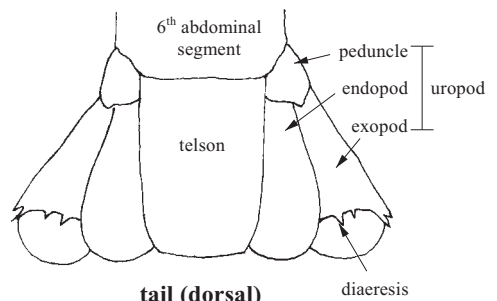
**abdomen (lateral view)**



**lateral view of carapace**



**abdomen (cross-section)**



**tail (dorsal)**

## GENERAL REMARKS

Lobsters include a variety of crustaceans ranging in size from a few to more than 60 cm (measured dorsally either from the tip of the rostrum, i.e. Nephropidae and Enoplometopidae, or the orbital margin to the distal end of the tail, thus excluding any of the appendages). They are more or less elongate animals with cylindrical or flattened bodies and a prominent tail or abdomen consisting of 6 movable segments and a terminal fan. The tail is usually about as long as the rigid and often spiny or tuberculate "head" or carapace. The eyes are stalked and usually movable in the sockets of the carapace, but reduced or absent in some families (e.g. the deepsea Polychelidae). The most conspicuous of the appendages of the anterior part of the body, situated before and below the carapace, are a pair of usually small, slender antennules, a pair of more robust antennae (long, simple and cylindrical in most families, plate-like in Scyllaridae) and 5 pairs of legs (pereopods, thoracic legs or walking legs). The first pair of legs is enlarged in certain families (Nephropidae, Polychelidae, Enoplometopidae), in others it differs hardly at all from the following legs (Palinuridae, Scyllaridae). The legs may all end in a simple curved dactyl (e.g. Palinuridae and Scyllaridae), some legs may terminate in true pincers or chelae (i.e. the first 3 pairs in Nephropidae, 4 or 5 pairs in Polychelidae, first pair in Enoplometopidae, and the last pair in females of Palinuridae and Scyllaridae), others may terminate in false pincers or subchelae (4 pairs in Enoplometopidae). The supple leaf-like abdominal appendages (pleopods) are short and biramous.

In the eastern Atlantic, the lobsters are represented by 5 families and about 30 species, of which only a few can be considered of interest to fisheries at the present time. The spiny and slipper lobsters (Palinuridae and Scyllaridae, respectively), as well as some true lobsters (Nephropidae) and reef lobsters (Enoplometopidae) usually occur in fairly shallow waters, often on rocky or coarse sediment substrata. Other true lobsters (*Nephropsis atlantica*) as well as the blind lobsters (Polychelidae) are found in deeper water on muddy bottoms.

The 3 major commercial species of lobsters from the coasts of Europe and the Mediterranean (e.g. *Homarus gammarus*, *Nephrops norvegicus* and *Palinurus elephas*) are present only in the northernmost part of the area of interest where they are still of considerable commercial importance. The majority of spiny lobsters (members of the genera *Jasus*, *Palinurus* and *Panulirus*) occurring in the area are also targeted by intense commercial and local fisheries wherever they are found in abundance. The slipper lobsters are marketed when of good size, but there is no special fishery for these species. The Polychelidae and the Enoplometopidae are of no commercial interest.

Spiny lobsters are practically all caught with lobster pots, but also with gillnets; occasional specimens are taken by trawlers as bycatch to other fishery products; slipper lobsters are usually taken with gillnets. Most species are sold and consumed locally; some of the spiny lobsters are exported (live or as frozen tails), mostly to Spain and France.

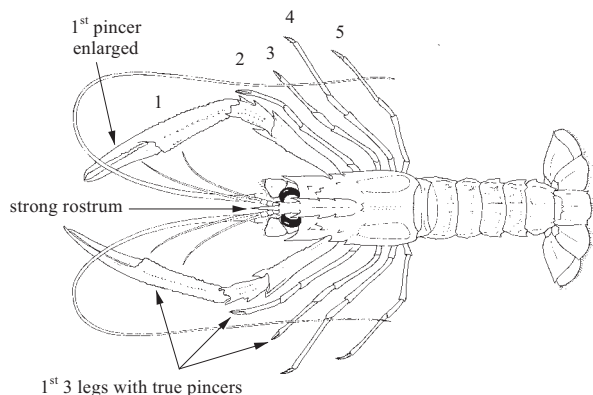
## GUIDE TO FAMILIES OCCURRING IN THE AREA

### NEPHROPIDAE

Page 205

#### True lobsters and lobsterettes

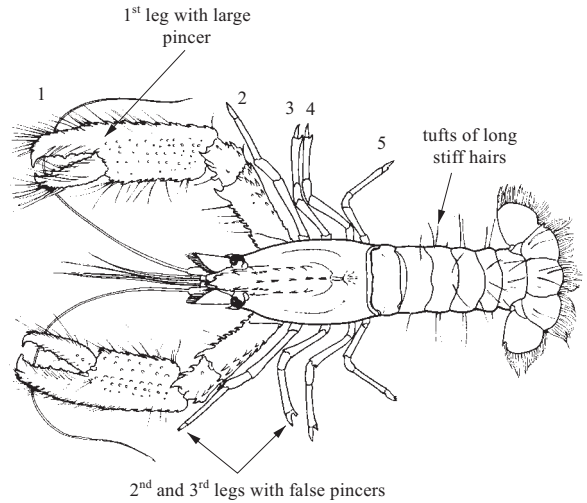
Body tubular; carapace with well-developed rostrum; antennae longer than body and thread-like, antennal scale, if present, with inner margin unarmed and curved; first 3 pairs of legs with true pincers, first pair of pincers much larger than others; tail fan entirely hardened, telson armed with fixed spines and with posterior margin broadly convex.



**ENOPLOMETOPIDAE**

**Reef lobsters**

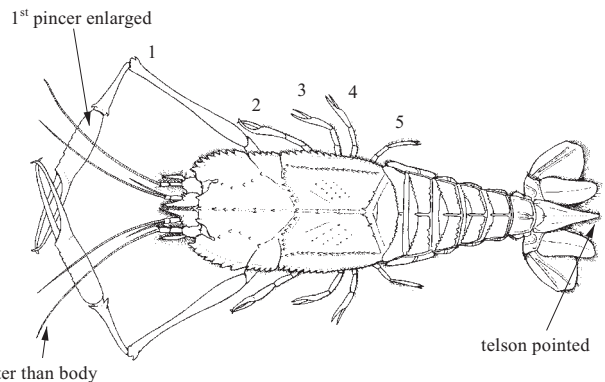
Body tubular, distributed with tufts of long stiff hairs; carapace with well-developed rostrum; antennae long and thread-like, antennal scale with inner margin unarmed and curved; first pair of legs with large pincers, second to fifth pair of legs slender and ending in false pincers; abdominal pleura more or less rounded and sometimes ending in strong ventral tooth; tail fan entirely hardened, telson bearing movable spines and with posterior margin broadly convex. Nocturnal, secretive and of no interest to fisheries in the area.



**POLYCHELIDAE**

**Blind lobsters**

Body soft and flattened dorsoventrally; carapace box-like; rostrum absent or rudimentary; eyes small and lacking pigment; antennae cylindrical, thread-like, shorter than body; first 4 or all pairs of legs with true pincers, first pair of pincers long and slender; tail fan entirely hardened, telson pointed. All species found in very deep waters and of no interest to fisheries in the area.



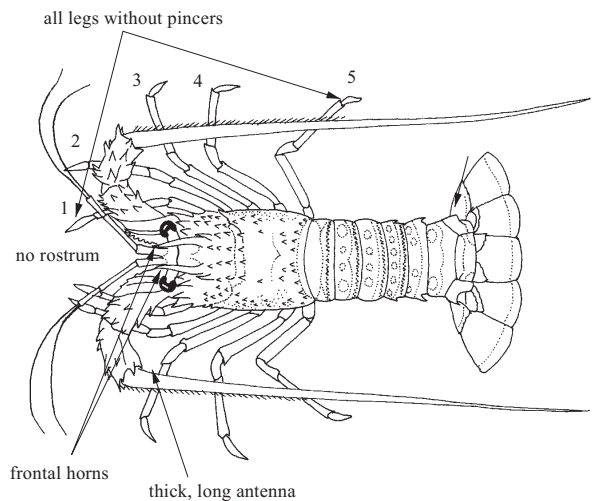
antenna shorter than body

telson pointed

**PALINURIDAE**

**Spiny lobsters**

Body tubular or slightly flattened dorsoventrally; carapace subcylindrical, laterally rounded or straight, surface spiny, pair of large frontal horns above eyes; rostrum absent or reduced to small spine; antennae very long, cylindrical, whip-like; legs without pincers and first pair not enlarged; posterior half of tail fan soft and flexible.



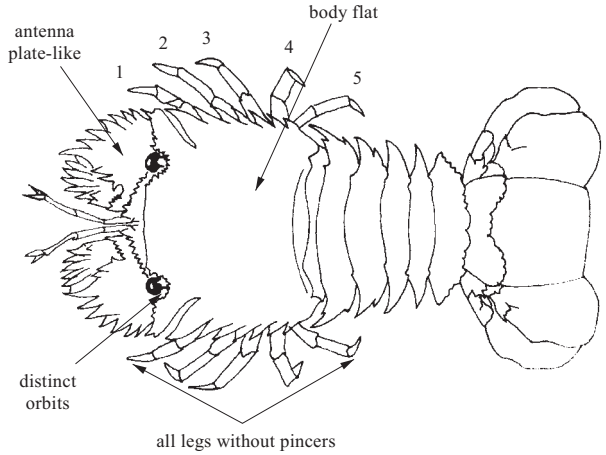
frontal horns

thick, long antenna

**SCYLLARIDAE**

**Slipper lobsters**

Body strongly flattened dorsoventrally; carapace depressed and laterally angular; rostrum absent or minute; eyes enclosed by distinct orbits and without large frontal horns; antennae plate-like; legs without pincers, none of them enlarged; posterior half of tail fan soft and flexible.



**KEY TO FAMILIES OCCURRING IN THE AREA**

- 1a. Body tubular . . . . . → 2
- 1b. Body strongly flattened dorsoventrally . . . . . → 4
  
- 2a. First 3 pairs of legs with chelae (pincers) or false chelae; first pair of chelae much larger than the others; rostrum well developed . . . . . → 3
- 2b. Legs without true chelae; rostrum absent or reduced to a small spine. . . . . **Palinuridae**
  
- 3a. Second and third pair of legs with true chelae; telson armed with fixed spines . . . **Nephropidae**
- 3b. Second and third pair of legs with false chelae; telson bearing movable spines (Fig. 1) . . . . . **Enoplometopidae**
  
- 4a. Legs without chelae; antennae plate-like . . . . . **Scyllaridae**
- 4b. First 4 pairs or all pairs of legs with true chelae, first pair long and slender; antennae thread-like; deep sea . . . . . **Polychelidae**

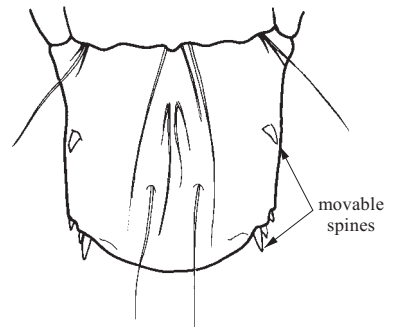






Fig. 1 telson

## LIST OF FAMILIES AND SPECIES OCCURRING IN THE AREA

The symbol  is given when species accounts are included.

### NEPHROPIDAE

-  *Homarus gammarus* (Linnaeus, 1758).
-  *Nephrops norvegicus* (Linnaeus, 1758).
-  *Nephropsis atlantica* Norman, 1882.





### ENOPLOMETOPIDAE

- Enoplometopus antillensis* Lütken, 1865.
- Enoplometopus callistus* Intès and Le Loeuff, 1970.







### POLYCHELIDAE

- Cardus crucifer* (Thomson, 1873).
- Pentacheles laevis* Bate, 1878.
- Pentacheles validus* A. Milne Edwards, 1880.
- Polycheles nanus* (Smith, 1884).
- Polycheles perarmatus* Holthuis, 1952.
- Polycheles sculptus* Smith, 1880.
- Polycheles talismani* (Bouvier, 1917).
- Polycheles typhlops* Heller, 1862.
  
- Willemoesia forceps* A. Milne Edwards, 1880.
- Willemoesia leptodactyla* (Willemoes-Suhm, 1875).

### PALINURIDAE

-  *Jasus tristani* Holthuis, 1963.
-  *Jasus lalandii* (H. Milne Edwards, 1837).
-  *Palinurus charlestoni* Forest and Postel, 1964.
-  *Palinurus elephas* (Fabricius, 1787).
-  *Palinurus mauritanicus* Gruvel, 1911.
-  *Panulirus argus* (Latreille, 1804).
-  *Panulirus echinatus* S.I. Smith, 1869.
-  *Panulirus regius* De Brito Capello, 1864.
-  *Projasus parkeri* (Stebbing, 1902).

### SCYLLARIDAE

- Acantharctus posteli* (Forest, 1963).
-  *Scyllarides delfosi* Holthuis, 1993.
-  *Scyllarides herklotsii* (Herklots, 1851).
-  *Scyllarides latus* (Latreille, 1803).
-  *Scyllarides obtusus* Holthuis, 1993.
-  *Scyllarus arctus* (Linnaeus, 1758).
- Scyllarus caparti* Holthuis, 1952.
- Scyllarus paradoxus* Miers, 1881.
- Scyllarus posteli* Forest, 1963.
-  *Scyllarus pygmaeus* (Bate, 1888).
- Scyllarus subarctus* Crosnier, 1970.

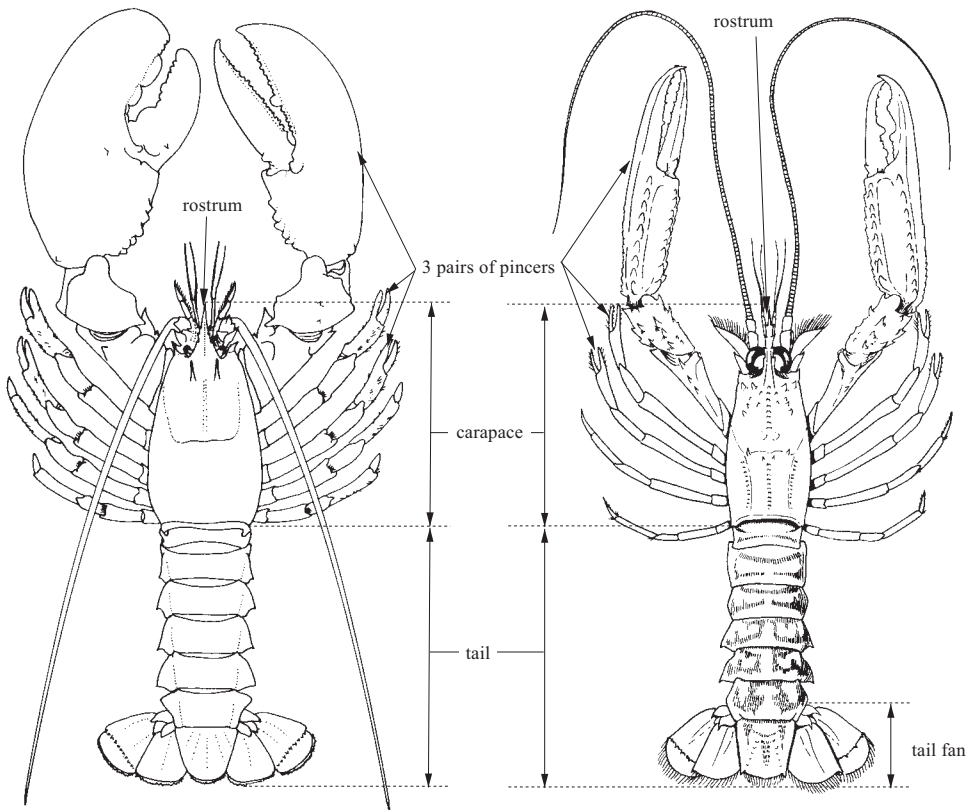
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## NEPHROPIDAE

### True lobsters, lobsterettes, homards, langoustines, cigalas

**Diagnostic characters:** Moderate- to large-sized crustaceans (8 to 65 cm). **Carapace (or “head”)** cylindrical, with well-developed, toothed median rostrum and variously ornamented with spines or nodules, mostly in anterior half, occasionally smooth, usually no hairs; eyes movable, usually well developed and with black pigment, but small and unpigmented or even absent in some deep-water forms. **Antennae long and whip-like**, antennules slender, ending in 2 long flagella. Abdominal segments either smooth, or transversely grooved, spiny, or granulate, pleura ending in acute ventral tooth. Tail powerful, with well-developed, entirely hardened fan; telson with fixed spines and posterior margin broadly convex. **First 3 pairs of walking legs ending in true pincers, the first pair, and especially its pincers, usually enlarged.** **Colour:** variable, depending on the species; some dark blue to black, others pink or red.



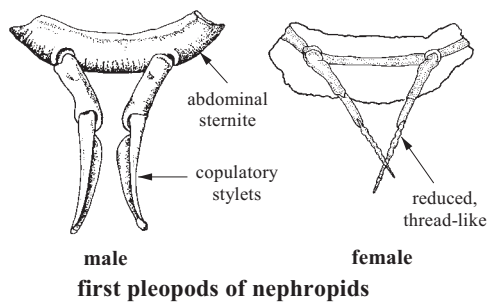
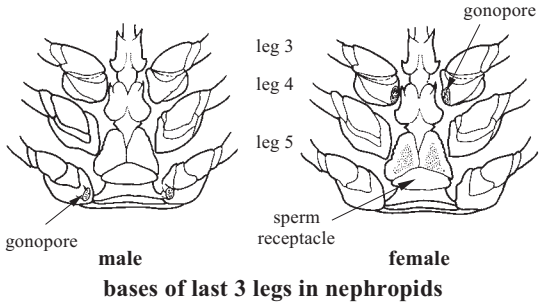
*Homarus*

*Nephrops*

examples of basic types of true lobsters

**Habitat, biology, and fisheries:** This family is represented by 3 species in the area of interest, ranging in size from 8 to 65 cm, and occurring from just below the tidal zone to greater than 1 800 m depth. All true lobsters are bottom-dwellers, usually preferring either muddy or rocky substrata which offer shelter. Some species are known to occur on sand or mud bottoms living in self-made burrows. The sexes are easily distinguished by position of the gonopores, which are situated at the bases of the third and fifth legs in the females and males, respectively (see figure). In addition, the first pleopods (“legs” of the abdomen) of males are transformed into a strong and rigid pen-like copulatory organ, while the first pleopods are reduced and thread-like in females. At present, the 2 important commercial species in the eastern central Atlantic are the European lobster, *Homarus gammarus* and the Norway lobster, *Nephrops norvegicus*. Although the major fishing grounds for both species are located to the north of the area of interest, these

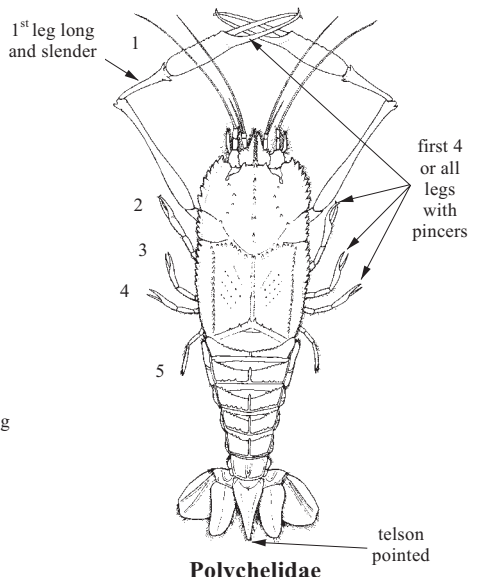
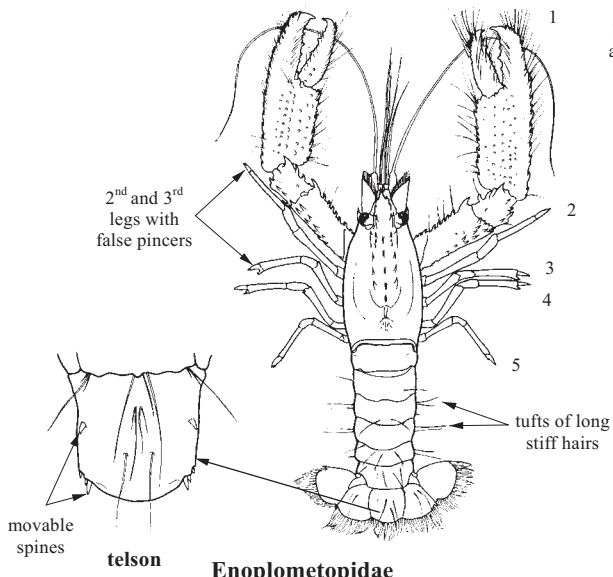
lobsters are also commercially exploited in Moroccan waters. All lobsters of sufficient size are utilized when captured in local fisheries. *Nephropsis atlantica* occurs in deeper waters (480 to about 1 800 m) than the two species of commercial importance; it has never been caught in great quantities and furthermore is too small (less than 10 cm) to be of significant commercial interest at present. The true lobsters are caught with lobster pots and bottom trawls (*N. norvegicus*) and mainly marketed fresh.



**Similar families occurring in the area**

Enoplometopidae: tufts of long stiff hairs distributed over body; carapace with well-developed rostrum; antennae thin and thread-like, antennal scale present; first pair of legs enlarged and forming true pincers, second and third legs with false pincers.

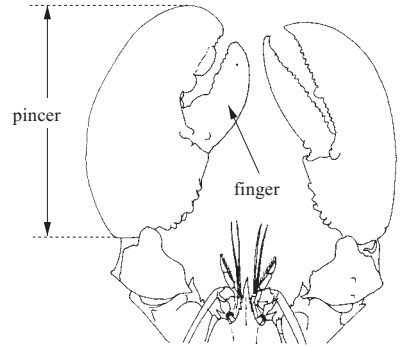
Polychelidae: blind, deep-sea lobsters with very soft body; carapace box-like; rostrum absent; antennae thin and thread-like, shorter than body; first 4 or all pairs of legs with pincers, first pair of legs long and slender; telson pointed.



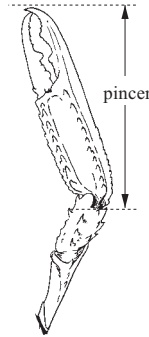


**Key to the genera of Nephropidae occurring in the area**

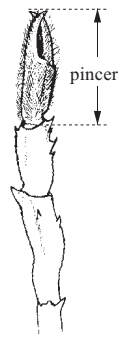
- 1a. First pair of legs large, massive; surface of palm smooth, without grooves or ridges or dense pubescence (Fig. 1); abdomen smooth, without grooves, ridges, or pubescence . . . . . **Homarus**
- 1b. First pair of legs rather slender; surface of palm with hairy grooves or a dense pubescence; abdomen with transverse piliferous grooves or with dense pubescence . . . . . → 2
  
- 2a. Eyes large; cornea very large, black, kidney-shaped; pincers with longitudinal raised rows of tubercles and piliferous grooves (Fig. 2); abdomen with transverse wide piliferous grooves, 1 or 2 per segment . . . . . **Nephrops**
- 2b. Eyes very small, inconspicuous; cornea without black pigment; pincers without grooves but with woolly hairs (Fig. 3); abdomen without grooves, but with median longitudinal ridge . . . . . **Nephropsis**



**Fig. 1 Homarus**







**Fig. 2 Nephrops**



**Fig. 3 Nephropsis**

**List of species occurring in the area**

The symbol  is given when species accounts are included.

-  *Homarus gammarus* (Linnaeus, 1758).
-  *Nephrops norvegicus* (Linnaeus, 1758).
-  *Nephropsis atlantica* Norman, 1882.

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***Homarus gammarus* (Linnaeus, 1758)**

**Frequent synonyms / misidentifications:** *Homarus vulgaris* H. Milne Edwards, 1837 / None.

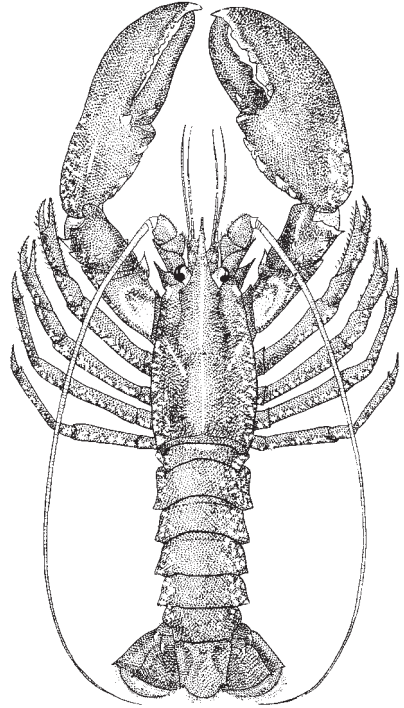
**FAO names:** **En** – European lobster; **Fr** – Homard européen; **Sp** – Bogavante.

**Diagnostic characters:** Carapace smooth, with only 2 pairs of spines behind eyes, the external pair very small. Rostrum strong, about one-quarter length of carapace, its lateral margins armed with 4 or 5 teeth; a median groove extending from tip of rostrum to posterior border of carapace. Abdominal segments smooth, without teeth or crests. First pair of legs ending in large pincers, one with cutting edges of fingers finely denticulated (cutting pincer) and the other with stronger irregular teeth (crushing pincer). Second and third pairs of legs much more slender, but also with pincers. **Colour:** bluish black, with mottlings on upper side, underside yellowish.

**Size:** Maximum: 65 cm; common 35 to 40 cm, rarely exceeding 50 cm.

**Habitat, biology, and fisheries:** Inhabits rocky bottoms from the coastline to about 60 m depth. These animals are nocturnal and territorial, living in holes or crevices. Juveniles and adults dig out hollows or tunnels under boulders or stones with 1 or more openings, using the hollows for shelter. Foraging occurs at night. Diet is variable, consisting mainly of crabs, gastropods and polychaetes, with mussels and seastars constituting a minor portion of the diet. Lobsters normally do not feed in the winter, but remain in their shelters when the water temperature falls below 5°C. When water visibility is poor at depths of 10 to 15 m, lobsters will leave their shelters during the daytime to forage for food. Females mature at 80 to 119 mm carapace length. Temperature is believed to regulate spawning; lobsters from warmer waters start egg incubation later than individuals in cooler waters. Around the United Kingdom spawning occurs from June to September. Females spawn every other year until some point in their life when spawning frequency changes to twice every 3 years. Eggs are carried on pleopods for 9 to 13 months. Fecundity estimates for United Kingdom, locations range from 10 972 to 28 606 eggs per female. Due to depleted populations, interest in restocking, enhancement and release experiments is great. For example, wild females with external egg clutches are captured and maintained until larvae are spawned; larvae are reared to juvenile stage for release back into natural populations. Caught regularly off the Moroccan coast, but major fishing areas for this species are in the Mediterranean and further north. Fished in coastal waters mainly by lobster pots, but creels and trammel nets (in the Mediterranean) are also used. Sold fresh in local markets.

**Distribution:** Eastern Atlantic; in the area, from the Straits of Gibraltar to southern Morocco, as far south as Agadir, and perhaps southward to Ifni; northward extending into the Mediterranean and the Black Sea, as well as along the Atlantic coasts of Europe to the Lofoten Islands.



***Nephrops norvegicus*** (Linnaeus, 1758)

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

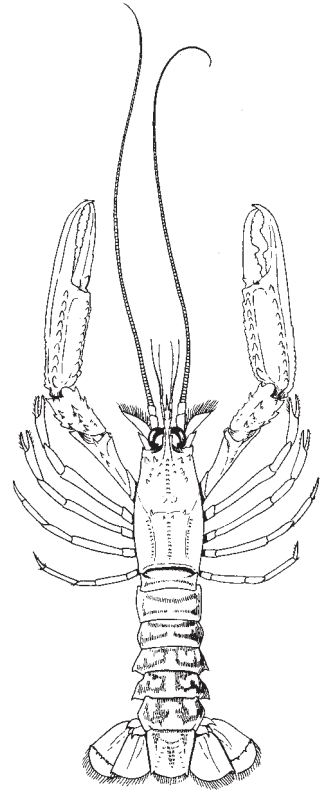
**FAO names:** En – Norway lobster; Fr – Langoustine; Sp – Cigala.

**Diagnostic characters:** **Carapace** covered with short hair and **armed with sharp spines** arranged mainly in longitudinal rows; some spines placed on margins of transverse (cervical) groove; **rostrum rather slender**, about half length of the rest of carapace, **tip curved upward**, **lateral borders armed with 3 or 4 spines**, **ventral margin with 1 or 2 teeth**. **Upper side of abdominal segments with broad hairy grooves interrupted at midline and extending to strongly developed lateral plates** (pleura); exopod of tail fan with diaeresis. First pair of walking legs developed into strong, elongated pincers, armed with spines arranged in longitudinal series; second and third pairs of legs much smaller, but also ending in pincers. Antennal flagellum longer than body; scaphocerite (antennal scale) present; antennal peduncle with large, wide spine near base of scaphocerite. **Eyes large, kidney-shaped, well pigmented.** **Colour:** pink with dark orange-red spots, especially distinct on fingers of pincers and on segment preceding them (carpus); eggs bright greenish blue.

**Size:** Maximum: 24 cm; common to 15 cm.

**Habitat, biology, and fisheries:** Inhabits mud or sandy-mud substrata on continental shelf and slope, mainly between 100 and 300 m depth, but may occur from 15 to 870 m. Individuals spend most of their time hidden in their burrow, which they excavate themselves. Burrows usually occur in groups of 5 to 10; tunnels sometimes cross each other. Some evidence of rhythmic activity, possibly related to light levels, which governs emergence from the burrow; pressure and bottom type may also influence amount of time spent outside burrow. Foraging usually occurs at dawn or dusk. Diet is highly variable, consisting mainly of decapod crustaceans, euphausiids, peracarids and fishes; cnidarians, gastropods, bivalves, polychaetes and echinoderms are also taken; can be cannibalistic. Preferred prey groups are those which are dominant in the area surrounding the burrow, either in the megabenthic community or in suprabenthic zooplankton communities. Ovigerous females are found practically throughout the year. Eggs are laid in summer; hatching occurs at end of winter or beginning of spring. Females reach maturity between their second and third year, at a size of 18 to 30 mm carapace length (CL). Fecundity estimates range from 800 to 5 000 eggs. Growth rate is similar between the sexes until maturity (5 to 6 mm CL/yr); afterwards males tend to grow slightly faster. The species is of considerable commercial value and is targeted throughout its range. Fished mostly in spring and summer with bottom trawls but lobster pots or creels are used in some areas. On the continental shelf, the fishery is most efficient in early morning, at twilight or in nights with full moon; on the continental slope, however, the fishery is most productive in daytime. Sold fresh and frozen; also canned, either as plain peeled tails or prepared as “bisque de langoustines”. Under the Italian name Scampi (plural of Scampo) it was sold throughout Europe as a highly esteemed food; but soon the name Scampi also was used for large penaeid shrimps.

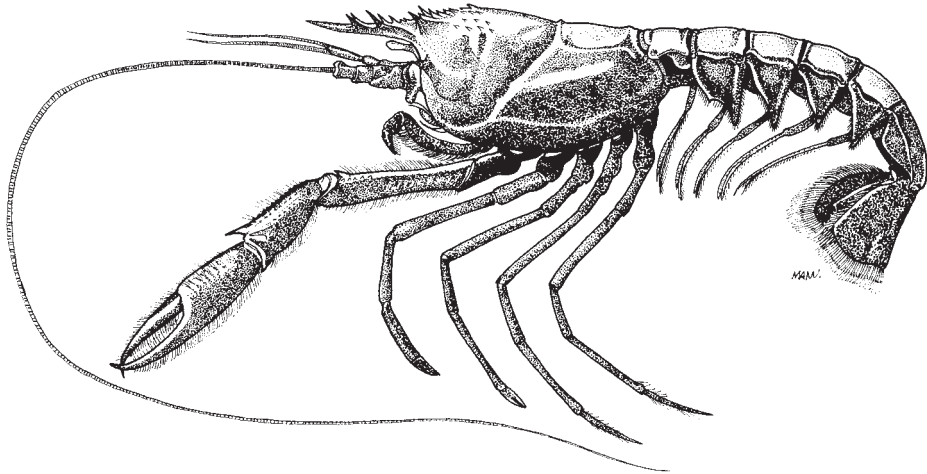
**Distribution:** Eastern Atlantic; in the area, from Straits of Gibraltar to Casablanca (Morocco), Canary Islands (around Lanzarote and possibly Dacia and Conception banks). Also present in Mediterranean and extending northward to Norway, the Faeroe Islands and Iceland.



***Nephropsis atlantica* Norman, 1882**

**Frequent synonyms / misidentifications:** None / *Nephropsis sulcata* Macpherson, 1990.

**FAO names:** En – Scarlet lobsterette; Fr – Langoustine écarlate; Sp – Cigala escarlata.



**Diagnostic characters:** Carapace finely granular; granules coarsest before cervical groove and on carinae (ridges); rostrum relatively slender, about half length of rest of the carapace, tip straight, lateral borders armed with two pairs of strong spines. Abdomen finely granular, without spines or grooves, but with distinct, low median carina visible on segments 2 to 6; all pleura end in sharp point, margins with sharp small granules; tail fan well developed, exopod with diaeresis. Antennae long and whip-like, longer than body; scaphocerite (antennal scale) absent. Eyes small, movable, but lack pigment. **Colour:** bright orange-red, lighter orange to yellowish on dorsal surface and first pair of chelae.

**Size:** Maximum: about 11 cm; commonly 5 to 10 cm.

**Habitat, biology, and fisheries:** On muddy bottoms between 470 and 1 804 m depth, commonly between 900 and 1 400 m. Of no interest to fisheries at this time; small size and great depth of occurrence make its suitability for a fishery unlikely.

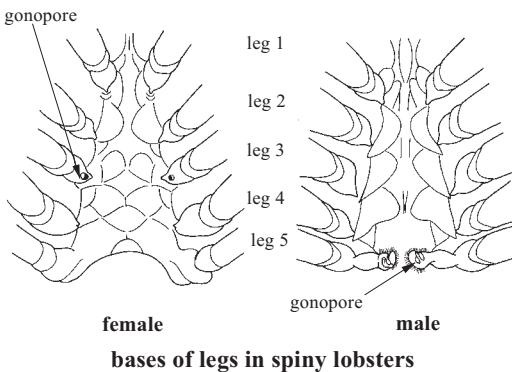
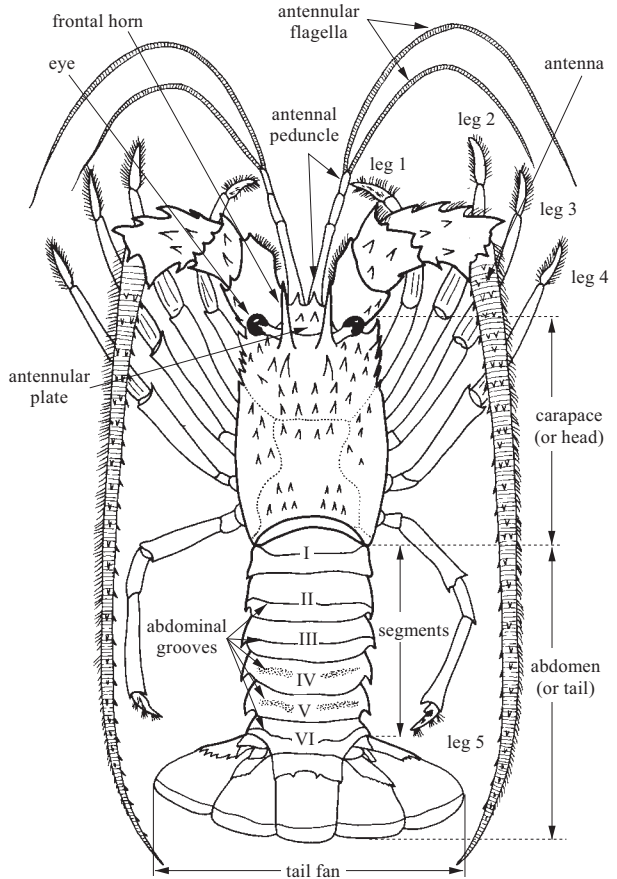
**Distribution:** Eastern Atlantic; Faroe Islands and northwestern Scotland to Namibia (approximately 61°N to 24°S); Madeira, Canary Islands, Cape Verde Islands.



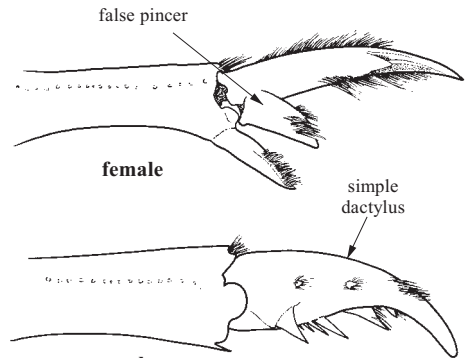
**PALINURIDAE**

**Spiny lobsters, langoustes, langostas, rock lobsters**

**D** **Diagnostic characters:** Moderate- to large-sized crustaceans (35 to 50 cm). Body tubular or slightly flattened dorsoventrally. **Carapace (or 'head')** rounded in section (subcylindrical), without well-developed rostrum, ornamented with spines and nodules of various sizes. **Eyes well developed, each protected by strong, spiny frontal projection of the carapace (frontal horns).** **Antennae long and whip-like; antennal scale absent; antennules slender, each consisting of a segmented peduncle and 2 long or short flagella; bases of antennae usually separated by broad antennular plate, often bearing 1 or 2 pairs of spines, but spineless in some species.** Some genera with a projection developed from base of antenna forming a stridulating organ with rim of antennular plate which can produce a grating sound when antennae are moved. Both abdomen and tail fan well developed and powerful, **posterior half of tail fan soft and flexible; telson soft and flexible posteriorly, strongly chitinized only in basal portion.** Abdominal segments either smooth, with transverse groove, or scale-like sculpturing. **Walking legs usually without true pincers or chelae, first pair usually not greatly enlarged; occasionally imperfect pincers may be present in adult males, females may have small pincers on the fifth pair of walking legs.** **Colour:** most species brightly coloured and patterned with bands or spots.

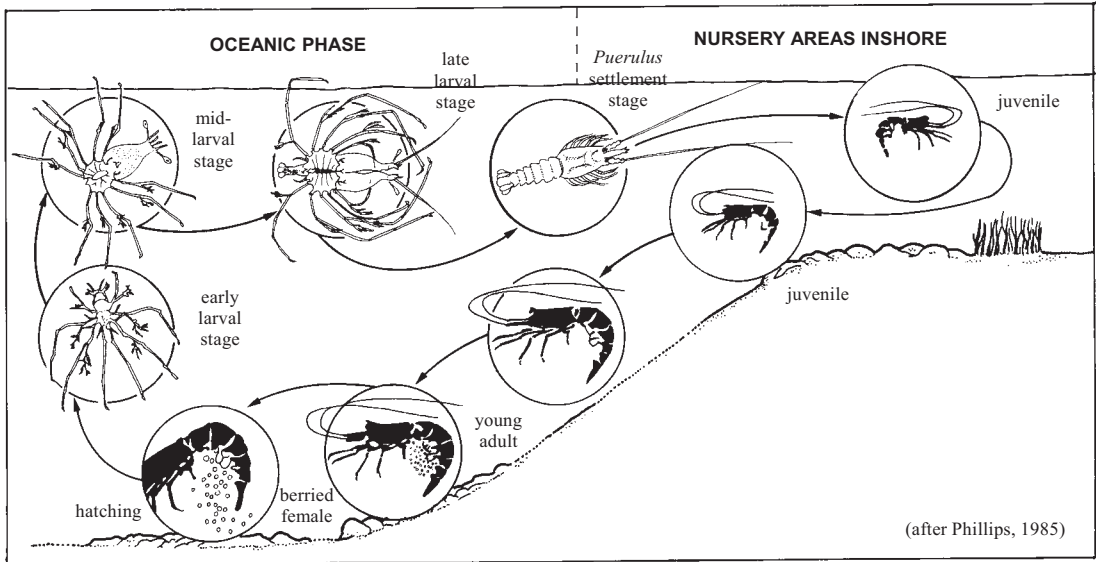


**female**  
**male**  
**bases of legs in spiny lobsters**



**female**  
**male**  
**terminal segments of 5<sup>th</sup> leg in spiny lobsters**

**Habitat, biology, and fisheries:** This family includes 9 eastern central Atlantic representatives ranging in maximum size from 35 to 50 cm. Most are shallow-water forms (rarely extending beyond 100 m depth), living singly or in groups in coral reefs, rocky areas, or other habitats that offer protection; 2 species, *Palinurus mauritanicus* and *P. charlestoni*, are more common in deeper water, at depths greater than 300 m. Sexes easily distinguished by the position of the gonopores which are situated at the bases of the third and fifth legs in females and males, respectively. Members of this family are characterized by the eggs (usually orange in colour) being very small and numerous, and by having a relatively shorter carry time and very long planktonic larval stages (i.e. phyllosoma). The spiny lobster fishery in this region is confined mostly to the northern part (Morocco, Mauritania, Senegal, Cape Verde Islands), while farther south there is a local fishery of minor importance. All species are primarily caught with lobster pots, sometimes with nets, trawls, or by hand.



life cycle of spiny lobsters of the genus *Palinurus*

**Similar families occurring in the area**

No other family of lobsters has the following combination of characters: spiny, subcylindrical carapace, strong frontal horns over eyes, long, whip-like antennae and all walking legs without true pincers.

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

- 1a. Abdominal segments with scale-like sculpturing (Fig.1). . . . . ***Jasus***
- 1b. Abdominal segments without scale-like sculpturing . . . . . → 2
  
- 2a. Abdominal segments with median, longitudinal ridge . . . . . ***Projasus***
- 2b. Abdominal segments without median, longitudinal ridge, instead abdominal segments with either complete or interrupted transverse groove. . . . . → 3

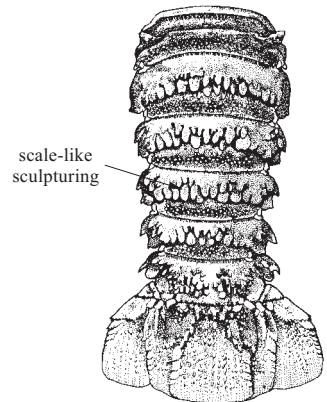
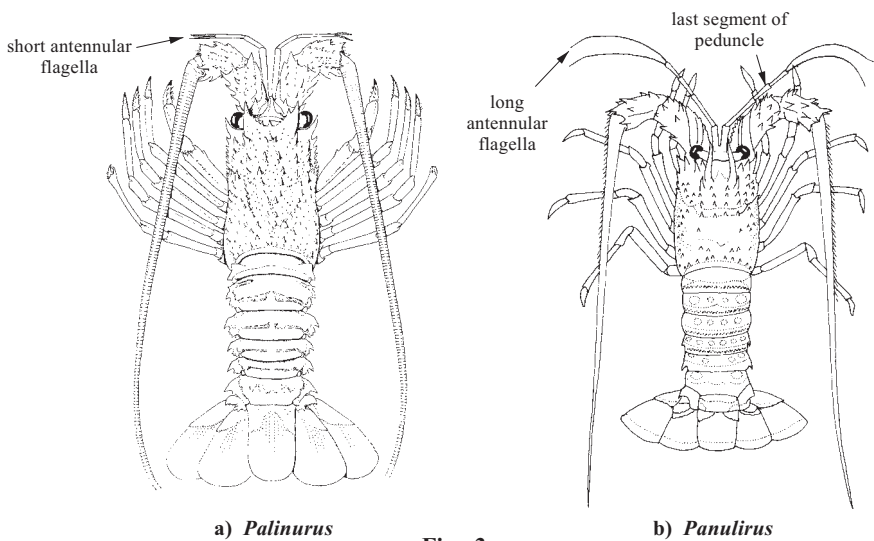
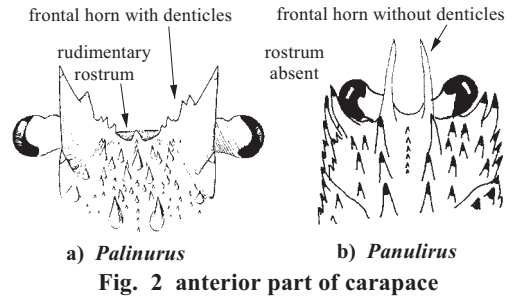


Fig. 1 *Jasus*

3a. Frontal horns with denticulations on inner margin, denticles also present on anterior margin of carapace between horns; rudimentary rostrum present as large denticle (Fig. 2a); segment 6 with roughened, subspinose patch of sharp tubercles on upper surface; antennular flagella shorter than last segment of peduncle (Fig. 3a) . . . . . ***Palinurus***

3b. Frontal horns and anterior margin of carapace between horns without denticles; rostrum absent (Fig. 2b); segment 6 smooth to somewhat uneven but not bearing subspinose patch of sharp tubercles on upper surface; antennular flagella longer than entire peduncle (Fig. 3b) . . . . . ***Panulirus***



**Key to the species of *Jasus* occurring in the area**

1a. Large spines of carapace broad and flattened, about as wide as long and much larger than the small spines; sculpturing on abdomen consists of relatively few squamae (Fig. 4a); extensive smooth area anteriorly on each segment . . . . . ***Jasus tristani***

1b. Large spines of carapace narrow, often 3 or 4 times as long as wide and not very different from the small spines; sculpting on abdomen more deticulate, with relatively smaller, more numerous, narrower squamae; sculpturing present on anterior half of each segment (Fig. 4b) . . . ***Jasus lalandii***

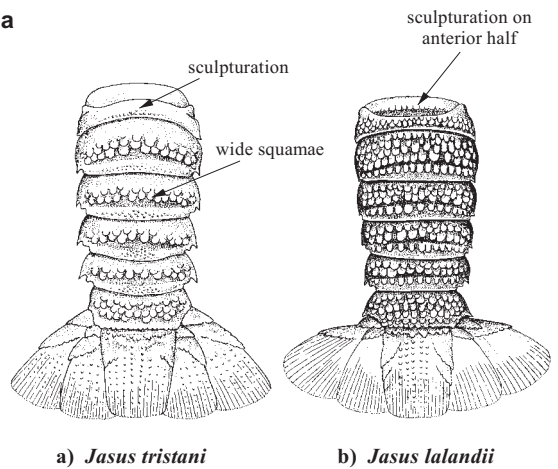
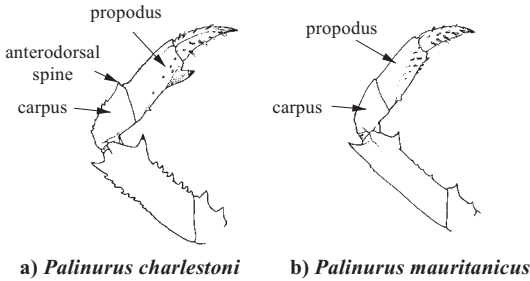


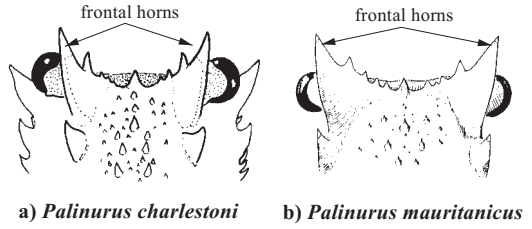
Fig. 4 abdomen (dorsal view)

**Key to the species of *Palinurus* occurring in the area**

- 1a. Carpus of first pair of walking legs with anterodorsal spine (Fig. 5a); anterior margin of carapace (between horns) deeply concave (Fig. 6a) . . . . . → 2
- 1b. Carpus of first pair of walking legs without anterodorsal spine (Fig. 5b); anterior margin of carapace (between frontal horns) not deeply concave (Fig. 6b) . . . . . ***Palinurus mauritanicus***



**Fig. 5 first pereiopod of male**

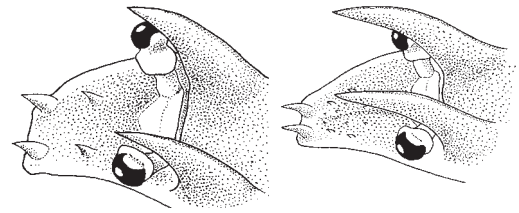


**Fig. 6 anterior part of carapace (dorsal view)**

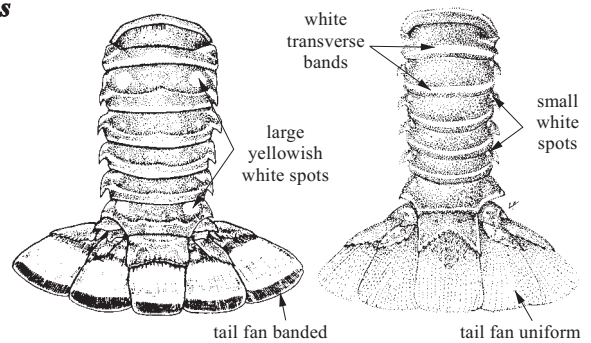
- 2a. Legs brownish red with yellowish white longitudinal stripes; abdomen dark (brownish red to brownish violet) with symmetrical white or yellowish blotches on segments 1 to 5; occurs in shallower water ( $\leq 70$  m) . . . . . ***Palinurus elephas***
- 2b. Legs reddish with broad dark bands on each segment; abdominal reddish with white spots symmetrically distributed on each side of midline; occurs in deeper waters (50 to 300 m) . . . . . ***Palinurus charlestoni***

**Key to the species of *Panulirus* occurring in the area**

- 1a. Antennular plate with 2 pairs of strong spines (Fig. 7a) . . . . . → 2
- 1b. Antennular plate with 1 pair of strong spines (Fig. 7b) . ***Panulirus echinatus***
- 2a. Abdominal segments with complete transverse groove, without short hairs, only slightly interrupted in midline; tail fan with dark brown pigment band on posterior margin; abdomen with 4 conspicuous yellowish white spots, 1 each on the dorsolateral portion of segments 2 and 6 (Fig. 8a) . . . . . ***Panulirus argus***
- 2b. Abdominal segments with shallow transverse grooves filled with short hairs and broadly interrupted in midline; (most conspicuous on segments 2 to 4); tail fan uniform or with thin dark brown pigment band on posterior margin; abdomen green, each segment with white transverse band separated from posterior margin by very dark green or dark brown band; a single, small white spot on bases of pleura of each abdominal segment (Fig. 8b) . . . . . ***Panulirus regius***




**Fig. 7 antennular plate**












**Fig. 8 abdomen (dorsal view)**



**List of species occurring in the area**

The symbol  is given when species accounts are included.

-  *Jasus lalandii* (H. Milne Edwards, 1837).
-  *Jasus tristani* Holthuis, 1963.
-  *Palinurus charlestoni* Forest and Postel, 1964.
-  *Palinurus elephas* (Fabricius, 1787).
-  *Palinurus mauritanicus* Gruvel, 1911.
-  *Panulirus argus* (Latreille, 1804).
-  *Panulirus echinatus* S.I. Smith, 1869.
-  *Panulirus regius* de Brito Capello, 1864.
-  *Projasus parkeri* (Stebbing, 1902).

**Remarks:** *Panulirus argus* is an important commercial species from the western central Atlantic. A species account is included here because individuals of this species are captured on a regular basis in the Cape Verde Islands (R. Freitas, pers. comm.), where a small population seems to have become established. Live captures have also been reported from West Africa (Côte d'Ivoire) on 2 occasions. The occurrence of this species in the eastern central Atlantic may be due to an intentional or unintentional introduction.

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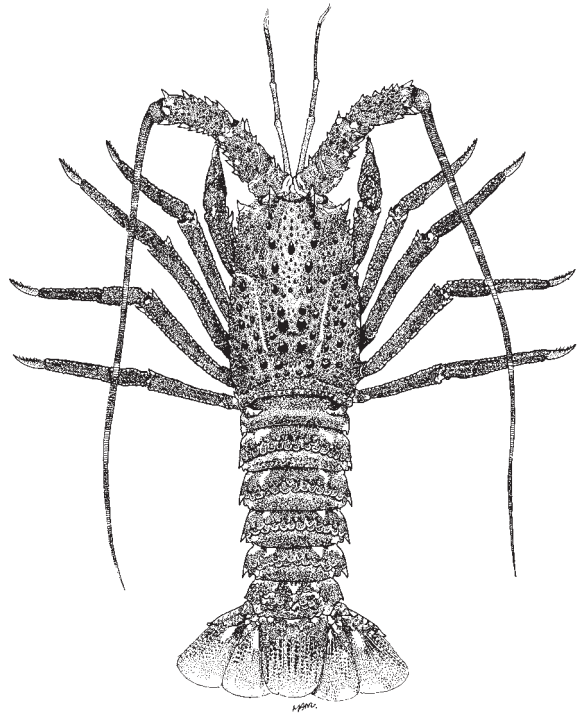
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*Jasus tristani* Holthuis, 1963

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

**FAO names:** **En** – Tristan da Cunha rock lobster; **Fr** – Langouste de Tristan da Cunha; **Sp** – Langosta de Tristán da Cunha.

**Diagnostic characters:** Carapace subcylindrical, widest in its posterior quarter, not inflated, upper surface with spinules and spines, the largest of which are arranged in longitudinal rows, **large spines as long as wide and much larger than smaller spines; rostrum sharply pointed**, directed forwards and slightly upwards; frontal horns sharply pointed, reaching about as far forward as or slightly anterior to rostrum, curved slightly forward, upper margin only slightly more convex than lower; longitudinal row of strong spines behind each frontal horn, extending towards cervical groove; no distinct antennular plate between bases of antennae; antennal flagella long, firm, flexible; **antennular flagella short. First abdominal segment with complete transverse groove; anterior half of first segment smooth, posterior half (posterior to transverse groove) with several rows of small tubercles anteriorly and with posteriormost portion smooth; segments II-V with wide transverse smooth areas along their anterior and posterior margins** (smooth areas clearly visible even in fully stretched animals) **anterior to transverse groove, 1 or 2 rows of broad and flat squames (scale-like sculpturing) only on posterior half of anterior portion of segment; each segment also with single row of very small flattened squamae posterior to transverse groove;** pleura of segments II-V end in 2 posteriorly directed sharply pointed teeth, anterovental tooth sharply pointed, posterodorsal tooth broadly triangular; segment VI with central scaly portion and with smooth areas along anterior and posterior margins and also over bases of the pleura; first pair of legs more inflated and shorter than others. **Colour:** reddish purple with white spots.



**Size:** Maximum: to about 40 cm.

**Habitat, biology, and fisheries:** Found on rocky bottoms, sometimes on gravel or shells in the kelp zone at depths between 0 and 200 m, commonly between 20 and 40 m. Oviparous females occur in September. Pueruli (postlarvae) found between December and February, juveniles between December and March, thus suggesting that most pueruli metamorphose by the end of February. Around 1950 the locally oriented fishery developed into a commercial operation. Caught with metal traps on longlines. Marketed live and as frozen tails.

**Distribution:** Southern Atlantic Ocean: around Tristan da Cunha, Gough Island, Vema Seamount, St Helena.



***Palinurus charlestoni*** Forest and Postel, 1964

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

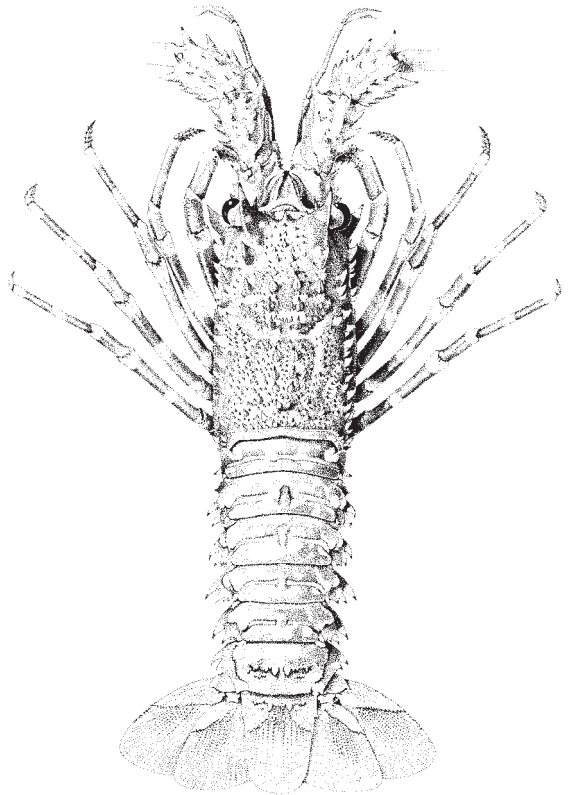
**FAO names:** **En** – Cape Verde spiny lobster;  
**Fr** – Langouste de Cap Vert; **Sp** – Langosta de Cabo Verde.

**Diagnostic characters:** Carapace subcylindrical, widest in posterior quarter, not inflated, upper surface with spinules and spines, the largest of which arranged in longitudinal rows; anterior border of carapace bearing **2 strong, narrowly triangular, externally convex frontal horns, their tips separated by deeply concave margin** armed with several denticles; **distinct rostrum**. Antennal flagellum long, whip-like; antennal flagellum short, shorter than last segment of peduncle. Tail powerful, with well-developed fan; abdominal segments smooth, without scale-like sculpturing, transverse groove present, distinctly interrupted in midline; segment VI with roughened subspinose patch of tubercles. **Carpus of first pair of legs with an anterodorsal spine; adult male with first pair of legs bearing strong tooth on anterior region of propodus; this, together with the dactyl which folds against it, forms an imperfect pincer;** female with fifth pair of legs ending in small pincers. **Colour:** reddish, with whitish marbling and spots over entire dorsal surface of thorax and abdomen; legs with **2 broad dark rings on propodus and merus and 1 on carpus;** no longitudinal lines of colour on the legs.

**Size:** Maximum: 50 cm; common to 40 cm.

**Habitat, biology, and fisheries:** Found on rocky, uneven bottoms at depths between 50 and 300 m, probably occurs deeper; often on steep slopes. Almost nothing is known about the biology of this species. A commercial fishery was attempted in 1963. On average, 2 spiny lobsters are caught per pot per day in the most productive areas. Caught with lobster pots (often lost due to rough bottoms). Marketed live and as frozen tails (mostly exported to France).

**Distribution:** Eastern Atlantic: Cape Verde Islands.



***Palinurus elephas* (Fabricius, 1787)**

**Frequent synonyms / misidentifications:**

*Palinurus vulgaris* Latreille, 1804 / None.

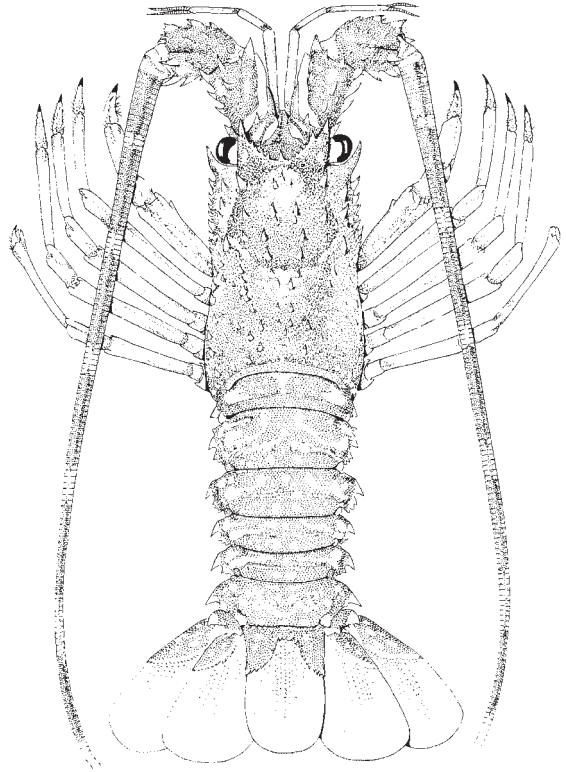
**FAO names:** En – Common spiny lobster;  
Fr – Langouste rouge; Sp – Langosta común.

**Diagnostic characters:** Carapace subcylindrical, widest in posterior quarter, not inflated, upper surface with numerous spinules and spines, stronger ones arranged in longitudinal rows; anterior border of carapace bearing **2 strong, narrowly triangular, frontal horns with slightly convex outer margin, their tips separated by a deeply concave margin** armed with several denticles; small, but **distinct, rostrum**. Antennal flagellum long, whip-like; antennular flagellum short, shorter than last segment of peduncle. Tail powerful, with well-developed fan; abdominal segments smooth, without scale-like sculpturing, transverse groove present, slightly interrupted in midline; segment VI with roughened subspinose patch of tubercles. **Carpus of first pair of legs with an anterodorsal spine. Colour:** general background brownish red to brownish violet; **abdomen dark, with pair of large symmetrical yellowish blotches on dorsal plates of segments I to V. Walking legs with longitudinal yellowish white lines.**

**Size:** Maximum: 50 cm; commonly 15 to 40 cm.

**Habitat, biology, and fisheries:** Found on rocky bottoms from sublittoral waters down to about 70 m depth; in cold waters mainly 10 to 30 m, deeper in warmer waters. In the Mediterranean, peak moulting occurs from December to January and May to June. In the United Kingdom, females moult from July to September and males moult mainly in winter; moult frequency declines with size. Percentage post-moult growth inversely proportional to size, especially in females; for specimens of equal carapace length, females are larger (total length). Eggs released 10 days after nocturnal deposition of spermatophores during July to September; 1 clutch carried annually. Ovigerous females occur from September onwards. Incubation lasts 5 to 9 months. Fecundity proportional to carapace length; fecundity estimates ranging from 20 000 to 210 000 for females 85 to 170 mm carapace length. Size at maturity ranging from 67 to 70 mm carapace length, with 50% of females mature at 82 to 86 mm carapace length. Eggs hatch from spring to early summer. Nocturnal. Adults feed preferentially on echinoderms and molluscs. Social behaviour is poorly understood; frequently in groups in rock fissures, with just long antennae visible. Fished with lobster pots, nets or by hand (spearing). Sold fresh in local markets.

**Distribution:** Eastern Atlantic, from southwestern Norway to Morocco; Canary Islands; the Azores; Madeira; Mediterranean Sea, except extreme eastern and southeastern parts.



***Palinurus mauritanicus* Gruvel, 1911**

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

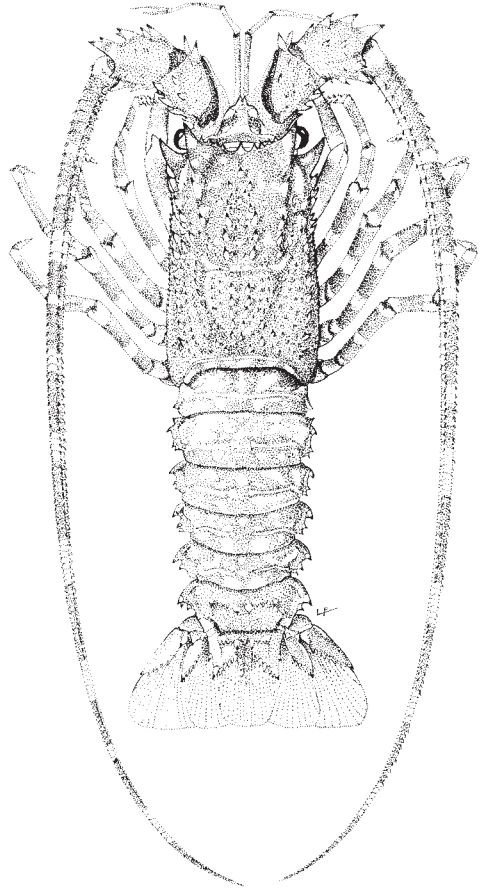
**FAO names:** **En** – Pink spiny lobster; **Fr** – Langouste rose; **Sp** – Langosta mora.

**Diagnostic characters:** **Carapace** subcylindrical in small and medium-sized specimens, **greatly inflated in adult males**, upper surface covered with spinules and spines, but less densely so than in *P. elephas*; larger spines arranged in longitudinal rows; anterior border of carapace bearing **2 strong, rather wide, externally convex, frontal horns, their tips separated by slightly concave margin** armed with several denticles; small, but **distinct, rostrum**. Antennal flagellum long, whip-like; antennal flagellum short, shorter than last segment of peduncle. Tail powerful, with well-developed fan; abdominal segments smooth, without scale-like sculpturing, transverse groove present, slightly interrupted in midline; segment VI with roughened subspinose patch of tubercles. **Carpus of first walking leg without anterodorsal spine**; adult males with first pair of legs hardly different from following pairs of legs and without subchelae (not forming imperfect pincers); females with fifth legs ending in pincers. **Colour:** reddish or pink, **with whitish marbling and spots over entire dorsal surface of thorax and abdomen**; **legs with irregular pink or white spots, which sometimes form distinct transverse bands**; no longitudinal stripes on legs. Antennae red with white bands.

**Size:** Maximum: 50 cm (1 record of 75 cm); commonly to 45 cm.

**Habitat, biology, and fisheries:** Found on rocky, mud and coral substrata at 40 to 600 m depth, commonly around 200 m. In the area, the main fishing grounds are off Mauritania and northern Senegal, near outer continental shelf margin. Most important commercial West African lobster. Previously taken by trawlers, mostly as incidental bycatch in addition to other fishery products. After 1954, trawlers began to specialize in the capture of *P. mauritanicus*; after 1958 the lobster pot fishery gradually replaced trawling. Marketed and exported live and frozen; mostly exported to France.

**Distribution:** Eastern Atlantic, from west of Ireland (53°N) to southern Senegal (14°N); Canary Islands; western Mediterranean (west of about 16°E).



***Panulirus argus* (Latreille, 1804)**

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

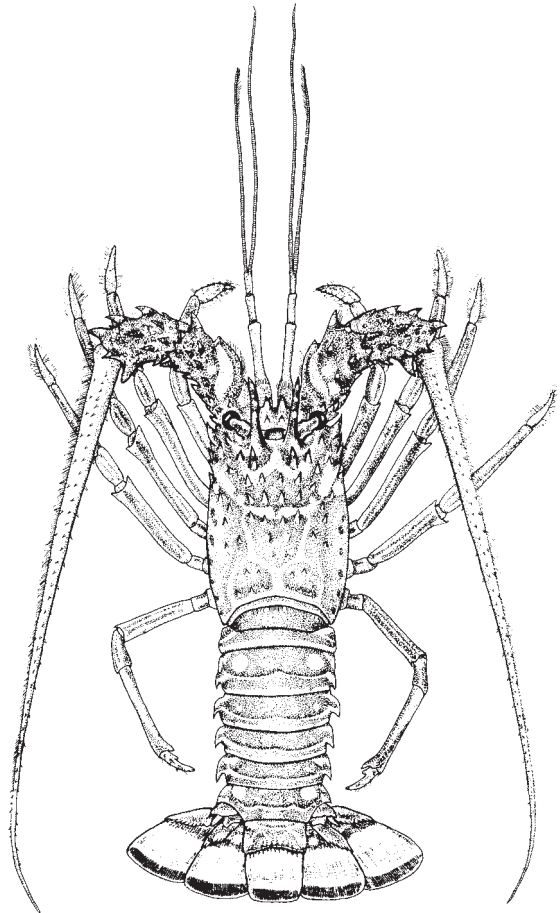
**FAO names:** **En** – Caribbean spiny lobster;  
**Fr** – Langouste blanche; **Sp** – Langosta común del Caribe.

**Diagnostic characters:** Carapace subcylindrical, covered with numerous spines and nodules of various sizes. Anterior border of carapace bearing **2 very strong, sharp and strongly curved frontal horns; anterior margin of carapace smooth, without distinct median rostrum.** Antennae long, stiff, whip-like; **antennules slender, flagella longer than peduncles; bases of antennae separated by broad antennular plate bearing 2 pairs of strong spines.** Tail powerful, with well-developed fan; abdominal segments smooth, without scale-like sculpturing, **each segment with complete transverse groove.** Legs without pincers. **Colour:** very variable, mottled greenish purple, also tan, brown, reddish, bluish or greenish; **tail with 4 conspicuous yellowish white spots, 1 on each side of second and last abdominal segments,** in addition to other smaller spots; posterior margin of each abdominal segment also with thin reddish purple band; **tail fan with conspicuous dark red or brown band along posterior margin;** legs with light and dark longitudinal stripes.

**Size:** Maximum: 45 cm; commonly to 28 cm.

**Habitat, biology, and fisheries:** Inhabits shallow water, occasionally down to 90 m, possibly deeper. Found among rocks, on reefs, in eelgrass beds, or in any habitat providing shelter. Gregarious and migratory. Females move to deeper water for spawning. Although not fished commercially in the area of interest, *Panulirus argus* is by far the most important commercial palinurid occurring in the west central Atlantic (Area 31). Previously taken only occasionally in the eastern central Atlantic; however, live captures of multiple individuals are caught on a more regular basis in Cape Verde Islands (R. Freitas, pers. comm.), where a small population seems to have become established. Caught mostly with traps, but also taken by hand, speared and trawled. Marketed fresh; tails are exported frozen or canned.

**Distribution:** Eastern Atlantic: Cape Verde Islands; scattered records from West Africa (Côte d'Ivoire). Elsewhere western Atlantic: Bermuda, North Carolina southward through Gulf of Mexico, the Antilles and coasts of Central and South America to Brazil (from Pará to São Paulo, including the oceanic island of Fernando de Noronha).



***Panulirus echinatus* Smith, 1869**

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

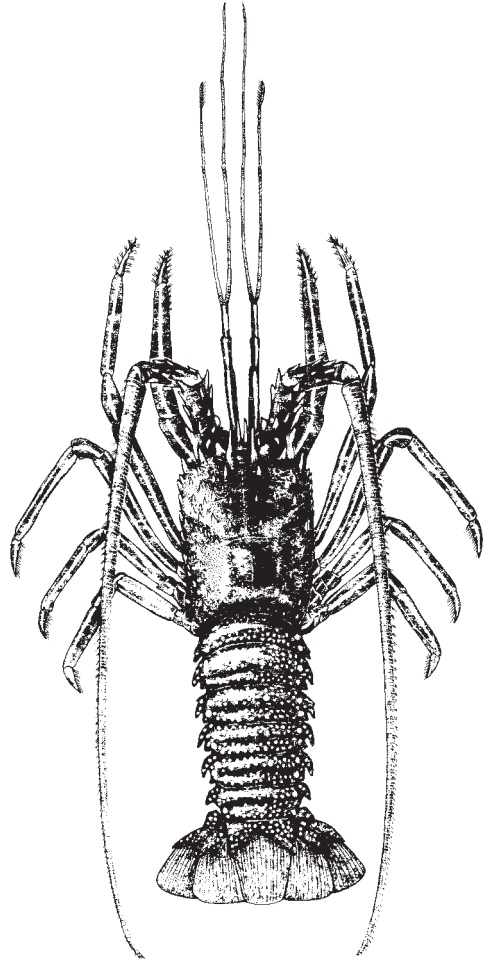
**FAO names:** **En** – Brown spiny lobster; **Fr** – Langouste brune; **Sp** – Langosta marrón.

**Diagnostic characters:** Carapace subcylindrical, covered dorsally with spines and spinules. Anterior border of carapace bearing **2 medium-sized, somewhat curved, frontal horns; anterior margin of carapace smooth, without distinct median rostrum.** Antennae long, stiff, whip-like; **antennules slender, flagella longer than peduncles; bases of antennae separated by broad antennular plate bearing only 2 strong spines.** Tail powerful, with well-developed fan; abdominal segments smooth, without squamiform sculpturation, **each segment with a sharply defined transverse groove, usually slightly interrupted in midline.** Legs without pincers (except for fifth leg of female). **Colour:** brown, reddish brown or purple, **densely speckled with numerous distinct, rounded whitish spots;** spots on tail evenly distributed, more or less uniform in size, except for **single larger spot at base of pleura on each segment;** tail fan uniformly red-orange anteriorly, with spots only on firm proximal portion, transitioning to dark blue-black on uropods, orange margin around each segment; legs striped on all segments, Antennae brown-orange proximally, progressing to dark brown at tip.

**Size:** Maximum: 39 cm; commonly to 30 cm.

**Habitat, biology, and fisheries:** Found on rocky bottoms from the coastline to 35 m depth. Fished wherever it occurs, but it is so rare in many areas that no important fishery exists. Reported to be of local commercial importance in St Helena; in the Cape Verde Islands it is the most abundant coastal lobster. Taken with lobster pots and occasionally by diving in the Cape Verde Islands. Marketed fresh.

**Distribution:** Eastern, western and central Atlantic Islands: Canary Islands, Cape Verde Islands, St Paul's Rocks, Fernando do Noronha, Atol das Rocas, Ilha da Trindade, Ascension, St Helena. Also western Atlantic: Extreme northeast Brazil (Ceará, Rio Grande do Norte and Pernambuco States).



***Panulirus regius*** De Brito Capello, 1864

**Frequent synonyms / misidentifications:** *Panulirus rissonii* (Desmarest, 1825) / None.

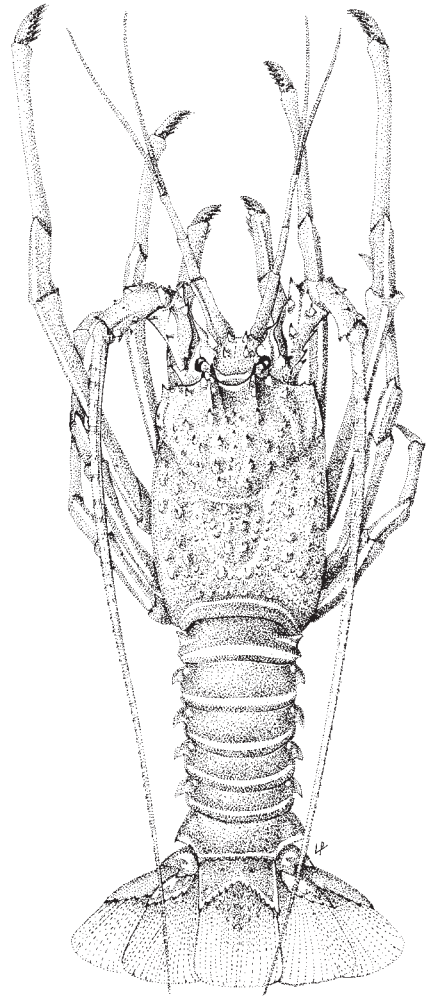
**FAO names:** **En** – Royal spiny lobster; **Fr** – Langouste royale; **Sp** – Langosta real.

**Diagnostic characters:** Carapace subcylindrical, covered dorsally with spines and scattered spinules. Anterior border of carapace bearing **2, usually short, triangular and slightly curved frontal horns; anterior margin of carapace smooth, without distinct median rostrum.** Antennae long, stiff and whiplike; antennules slender, **flagella longer than peduncles; bases of antennae separated by broad, antennular plate bearing 4 strong spines and sometimes a few very small additional spinules.** Tail powerful, with well-developed fan; **abdominal segments smooth, without scale-like sculpturing, each segment with wide transverse groove, filled with short hairs, not sharply delimited and interrupted on midline.** Legs without pincers (except for fifth pair of female). **Colour:** various shades of green; **tail green, each segment with white transverse band separated from posterior margin by very dark green or dark brown band;** small white spot on bases of pleura of each abdominal segment. Legs with longitudinal white and green stripes. Tail fan not banded.

**Size:** Maximum: 46 cm; commonly to 30 cm.

**Habitat, biology, and fisheries:** Inhabiting shallow water from the sublittoral to about 40 m depth, most commonly 5 to 15 m; on rock and sand substrata. Also reported on soft substrata between 500 and 600 m depth off Namibia. Despite an extensive fishing area for *P. regius*, this species is not among the most commercially important West African lobsters. Caught with lobster pots, bottom trawls, bottom setnets, tangle nets, creels and by hand. Has been intensively overfished in the Cape Verde Islands, and now is much rarer than in previous times. In shallow-water habitats, where it can be captured by hand, it has virtually all but disappeared. This species was the main bycatch product caught off Sierra Leone, during the primary fishing season of June and September to November in 1995–1996. Marketed live or frozen; a large part of the catch is exported to France and Spain.

**Distribution:** Eastern Atlantic: west coast of Africa (ca. 28°N to 15°S) between Cape Juby (Morocco) and Mocâmedes (south Angola); Cape Verde Islands; Canary Islands; and western Mediterranean (east coast of Spain, south coast of France).

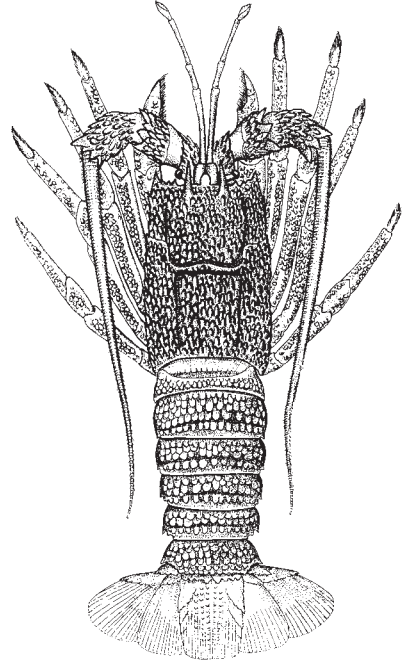




***Jasus lalandii*** (H. Milne Edwards, 1837)

**En** – Cape rock lobster; **Fr** – Langouste du Cap; **Sp** – Langosta del Cabo.

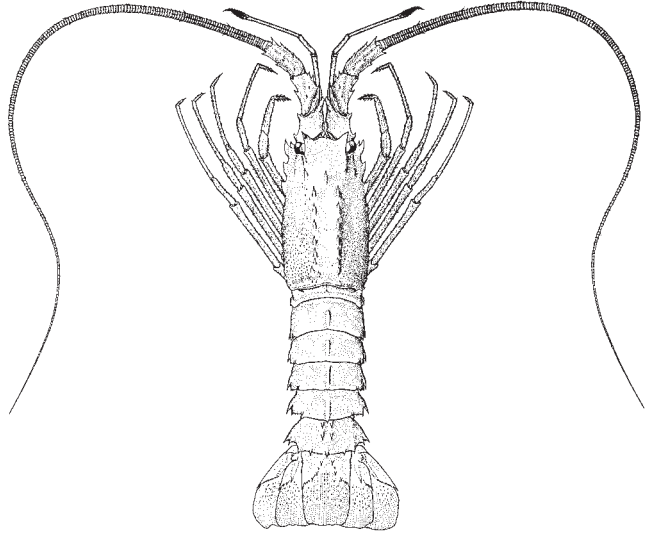
Maximum size 46 cm. Occurs in coastal waters on rocky substrata, sometimes with patches of sand and mud, at depths up to 100 m. Males moult between September and December and females moult between April and May after which mating takes place. Ovigerous females found from May to October. Females reach sexual maturity at 57 to 59 mm carapace length (CL). Hatching appears to be synchronized with the onset of upwelling; larvae settle in shallow-water kelp beds, adults in deeper waters. Lifespan is about 30 to 40 years. Feeds primarily on mussels, other invertebrates and sometimes seaweeds; octopus is an important predator, preying on a wide range of sizes. The fishery is of great importance throughout its range, but the major fishery is south of the area of interest. Captured by lobster pots and hoop nets. Catch sold fresh or cooked in local markets. Tails exported frozen in the shell, or peeled and canned. In Namibia, the current closed season for lobster is between November and May; individuals must be larger than 65 mm carapace length. Experimental work on culture techniques for this species is underway. In the eastern Atlantic; southern Africa from Cape Cross, Namibia (21°43'S 13°58'E), to Algoa Bay, Cape Province (33°50'S 25°50'E).



***Projasus parkeri*** (Stebbing, 1902)

**En** – Cape jagged lobster; **Fr** – Langouste dentelé; **Sp** – Langosta dentada.

Maximum size to about 15 cm. Found on muddy bottoms with rocks and coral between 370 and 841 m depth. No fishery at the present time; only rarely caught. Eastern Atlantic: Valdivia Bank, off Namibia; also reported from southeast Africa (Cape Province north of East London and Natal, South Africa), St Paul Island; New Zealand.

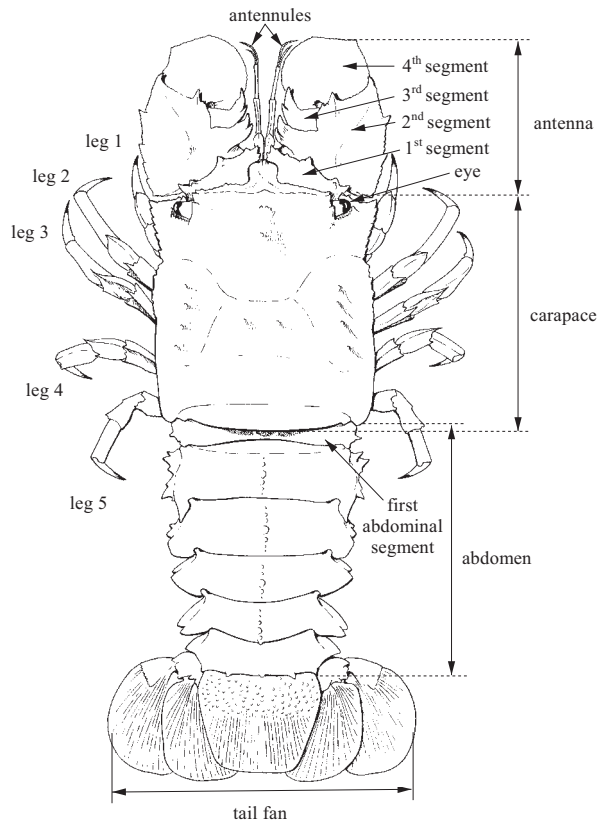


## SCYLLARIDAE

## Slipper lobsters, locust lobsters, flat lobsters

**Diagnostic characters:** Small- to large-sized crustaceans (5 to 45 cm). **Body more distinctly flattened dorsoventrally than in any other group of lobsters.** Carapace (or 'head') laterally angular, usually granular, sometimes with blunt spines, **rostrum absent or minute**; eyes small but distinct and pigmented, movable but recessed into anterior margin of carapace; no large frontal horns. **Antennae short and broad, extremely flattened and plate-like, lacking long flagella**; antennules short and slender, with short flagella. Tail broad, powerful, with well-developed fan; **posterior half of tail fan soft and flexible.** **All legs similar in size and generally without pincers** (except fifth leg of female ending in small pincer). **Colour:** usually drab, in various shades of brown; **anterior portion of first abdominal segment often with characteristic pattern of brightly coloured spots.**

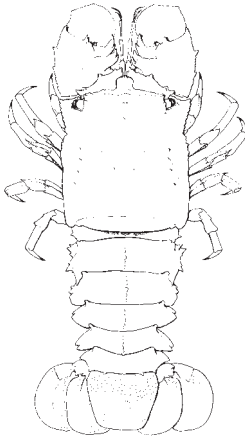
**Habitat, biology, and fisheries:** This family is represented by 10 species in the area of interest, ranging in size from 5 to 45 cm, and occurring from a few metres to about 150 m depth, with a few records to 360 m. All slipper lobsters are benthic species, many living on level bottoms (sand, mud or rock) but some preferring reef areas. No established commercial fishery exists for any of the eastern Atlantic species. Local fisheries are reported from Senegal and St Helena, and incidental captures by other fishing operations are known for at least 5 species. All of the slipper lobster catch is taken and consumed or sold in local markets. *Scyllarus* is the most diverse genus in the family. These slipper lobsters occur on both soft and hard bottoms from shallow to deep waters. These species are usually small in size, occur in low abundance and, therefore, are without economic value. Since the taxonomic status of many species of the genus *Scyllarus* is still unclear, a key to the species of this genus is not presented here.

**Similar families occurring in the area**

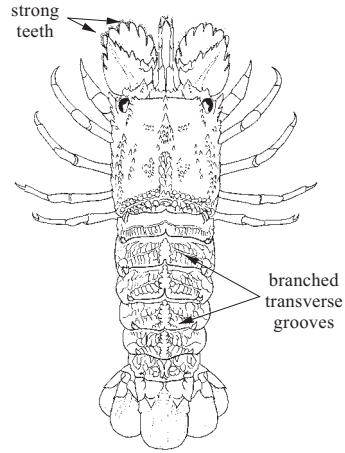
No other family of lobsters has such a flattened body or plate-like antennae without true flagella.

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

- 1a. Margin of distal plate (or fourth segment) of antennae rounded or with a blunt angle, lacking strong teeth; abdominal segments without transverse grooves, but evenly granular; size large, up to 45 cm (Fig. 1) . . . . . ***Scyllarides***
- 1b. Margin of distal plate of antennae cut into strong teeth; abdominal segments each with a branched transverse groove and scale-like ornamentation; size small, up to 12 cm (Fig. 2) . . . . . ***Scyllarus***



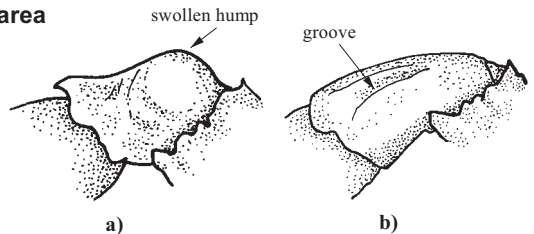
**Fig. 1 *Scyllarides***



**Fig. 2 *Scyllarus***

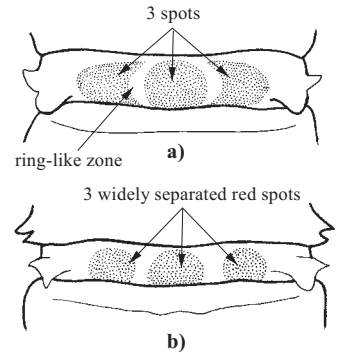
**Key to the species of *Scyllarides* occurring in the area**

- 1a. Carpus of first pereopod with distinct dorsal swelling on upper basal portion; swollen region with complete, very shallow groove (Fig. 3a) . . . . . → **2**
- 1b. Carpus of first pereopod without conspicuous dorsal swelling, but with a distinct dorsal groove (Fig. 3b) . . . . . → **3**




**Fig. 3 carpus of first pereopod**

- 2a. Three red spots on first abdominal segment of about equal size and placed close together; carapace relatively flat and rough, tubercles sharp, pubescence pronounced . . . . . ***Scyllarides obtusus***
- 2b. Three red spots on first abdominal segment distinctly separate and with median spot larger than outer spots; carapace more rounded and smoother in appearance, tubercles blunt and low, pubescence inconspicuous . . . . . ***Scyllarides delfosi***
- 3a. First abdominal segment with 3 red spots, central spot a circular ocellus (i.e. spot circular, surrounded by a ring-like zone), lateral spots broadly triangular with inner margin concave (Fig. 4a) . . . . . ***Scyllarides latus***
- 3b. First abdominal segment with 3 circular, widely separated red spots (Fig. 4b) . . . . . ***Scyllarides herklotsii***



**Fig. 4 first abdominal segment (dorsal view)**

**List of species occurring in the area**

The symbol  is given when species accounts are included.

*Acantharctus posteli* (Forest, 1963). Maximum 9 cm; Senegal to Congo, Bay of Cadiz (Spain).

 *Scyllarides delfosi* Holthuis, 1960.

 *Scyllarides herklotsii* (Herklots, 1851).

 *Scyllarides latus* (Latreille, 1803).

 *Scyllarides obtusus* Holthuis, 1993.

 *Scyllarus arctus* (Linnaeus, 1758).

*Scyllarus caparti* Holthuis, 1952. Maximum 5 cm; from Senegal to Angola.

*Scyllarus paradoxus* Miers, 1881. Maximum 6 cm; Senegal to Sierra Leone, São Tomé.

*Scyllarus posteli* Forest, 1963.

 *Scyllarus pygmaeus* (Bate, 1888).

*Scyllarus subarctus* Crosnier, 1970. Maximum 6 cm; southern Angola, northern Namibia.

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***Scyllarides delfosi* Holthuis, 1960**

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

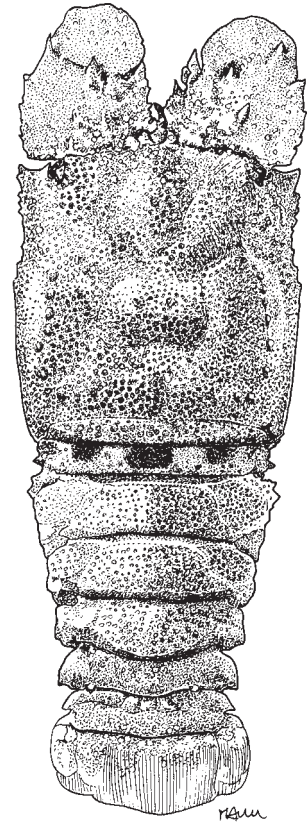
**FAO names:** En – Three-spot slipper lobster; Fr– Cigale à trois taches; Sp – Cigarra de tres manchas.

**Diagnostic characters:** Carapace massive, rectangular, almost as broad as long, more rounded in appearance, **densely covered with low, blunt tubercles, pubescence inconspicuous;** longitudinal row of several large pointed tubercles extending over branchial region; certain areas of surface somewhat elevated and separated by shallow, wide grooves; rostrum small. **Abdominal segments also covered with granules, mid-dorsal ridge absent.** Antennae transformed into paddle-shaped plates, each consisting of 4 visible segments; **margin of distal segment entire or minutely crenulated, rounded, with distinct external angle;** outer margin of second-largest segment with 2 broad and several small teeth, anterior margin with distinct tooth. **Carpus of first pereopod with large swollen hump on upper, basal portion and very shallow groove extending over this hump.** **Colour:** brownish red; **smooth anterior part of first abdominal segment with 3 red, well-separated spots,** central spot larger, circular, lateral spots irregular in shape, anterior part of second abdominal segment may have median red spot.

**Size:** Maximum 25 cm.

**Habitat, biology, and fisheries:** Found on mud or rocky substrata, including shell or coral fragments at depths from the littoral zone to 80 m. Of minor interest to fisheries; occasionally taken in dredges and bottom trawls, but not in commercial quantities. Marketed fresh locally.

**Distribution:** Eastern Atlantic: St Helena and Ascension Island; Western Atlantic: northern coast of South America from Venezuela to Brazil.



***Scyllarides herklotsii*** (Herklots, 1851)

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

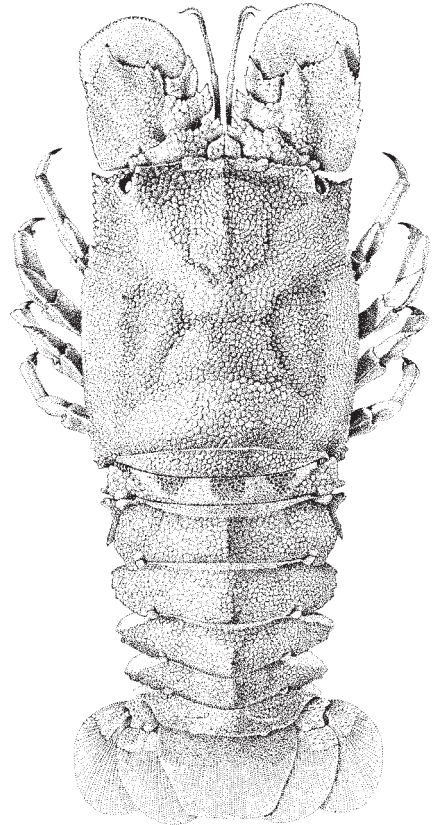
**FAO names:** En – Red slipper lobster; Fr – Cigale rouge; Sp – Cigarra roja.

**Diagnostic characters:** Carapace massive, rectangular, almost as broad as long, **densely covered with low, blunt tubercles**, interspersed with scattered short hairs; certain areas of carapace surface somewhat elevated and separated by shallow, wide grooves; rostrum small. **Abdominal segments also covered with granules, mid-dorsal ridge absent or rather indistinct.** Antennae transformed into paddle-shaped plates, each consisting of 4 visible segments; **margin of distal segment entire or minutely crenulated, rounded, with a blunt external angle**; second-largest segment with rather short, but distinct, teeth (especially on anterior margin). **Carpus of first pereopod with distinct dorsal groove and without conspicuous dorsal swelling.** **Colour:** brownish red to dark red; smooth anterior part of first abdominal segment with 3 circular, dark red, well-separated spots; tips of legs violet.

**Size:** Maximum: about 32 cm; commonly to 25 cm.

**Habitat, biology, and fisheries:** Found on sand, rock, or sometimes mud substrata at depths of 5 to 70 m, but also reported from deeper waters (beyond 200 m). This species is of minor commercial value. Fished for food wherever it occurs, but no targeted fishery. Usually caught with bottom trawls or bottom setnets. Marketed fresh locally.

**Distribution:** Eastern Atlantic: northern Senegal (St Louis, 16°N) to southern Angola (Ponta do Pinda 15°45'S).

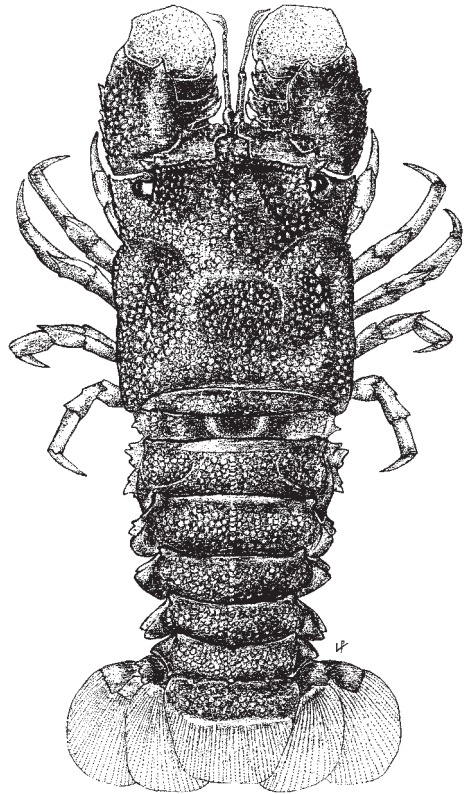


***Scyllarides latus* (Latreille, 1803)**

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

**FAO names:** **En** – Mediterranean slipper lobster; **Fr** – Grande cigale; **Sp** – Cigarra.

**Diagnostic characters:** Carapace massive, rectangular, almost as broad as long, **covered with large granules**, their bases hairy, and their summits provided with 1 or 2 horny tubercles; certain areas of carapace surface elevated and separated by grooves; anterior border truncate, rostrum slightly prominent. **Abdominal segments equally covered with hairy granules** in regions remaining exposed when animal is extended; **abdominal segments II, III and IV with blunt mid-dorsal ridge** consisting of tubercles cornified at tips. Antennae transformed into paddle-shaped plates, each consisting of 4 segments, of which second and fourth (distal) are the largest; second with rather short, but well differentiated teeth on its anterior and lateral borders; **borders of fourth segment rounded and entire, with only 1 blunt prominence in the antero-external region.** **Carpus of first pereopod with distinct dorsal groove and without conspicuous dorsal swelling.** **Colour:** brownish red; **smooth anterior part of first abdominal segment with 3 close-set, dark red spots; central spot ocellated, surrounded by a narrow circle of pale yellow; the 2 lateral spots irregular, broadly triangular, with inner margin concave and positioned against the yellow circle on either side;** antennules violet-blue.



**Size:** Maximum: 45 cm; commonly to 35 cm.

**Habitat, biology, and fisheries:** Lives on rocky and muddy bottoms at depths of 4 to 100 m. A nocturnal, gregarious species, generally occurring in groups of 2 or 3 individuals. Shelter during the day on the ceilings of caves and in natural dens; forage during the night. Diet consists mainly of molluscs, especially bivalves. Tend to be non-aggressive, but can form dominance hierarchies. Known predators include grey triggerfish, groupers, serranids and octopus. They occur in shallower waters of the southeastern Mediterranean region on the continental shelf (15 to 30 m depth) when water temperatures are the lowest (15 to 16°C), numbers decrease when water temperature increases to 26 to 27°C. In the Azores, lobsters begin moving toward shallow water in May; abundance peaks in July. These same lobsters return to deeper water in October after females shed their eggs in August and September. Seasonal shallow-to-deep migrations may occur to meet physiological and behavioural requirements for moulting. Adults probably moult once a year; moulting is believed to occur from December to February. Spawning occurs from June to August; egg bearing period lasts for approximately 6 to 8 weeks in the Azores, but females carried eggs for an average of 16 to 17 days in the Mediterranean. In the southeastern Mediterranean, males with white gelatinous spermatophores on the base of the fourth and fifth walking legs were observed in April (water temperature about 17°C); males ranged in size from 88 to 113 mm carapace length (CL). Berried females were observed between May and July when water temperature was 17 to 27°C. Number of eggs tends to be higher in larger females, ranging from 99 572 in a female measuring 98.8 mm CL to 107 105 in a female measuring 115.9 mm CL (mean of 102 730 eggs per female). Fished intensively throughout their range. Taken and eaten wherever captured, but because it is rare (due to severe overfishing), there is no commercial fishery. Demand for these lobsters and the high market prices they yield further increases the fishing pressure exerted by divers collecting lobsters by hand or spear-fishing. Along the southern coasts of Europe, this species has become so rare that it was



added to the list of marine species in need of protection. Regulations to protect dwindling populations include a complete ban on fishing (e.g. Azores and Italy) and designation of selected rocky habitats as marine parks (e.g. Israel, Spain). Taken incidentally with trammel nets, trawls, lobster pots and by hand. Marketed locally either fresh or frozen.

**Distribution:** Eastern Atlantic: Madeira, Canary and Cape Verde Islands, as well as along the coast of West Africa from the Straits of Gibraltar to at least Senegal and Gambia; entire Mediterranean (but not the Black Sea); off Portugal, from Lisbon southward; Azores.



*Scyllarides obtusus* Holthuis, 1993

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

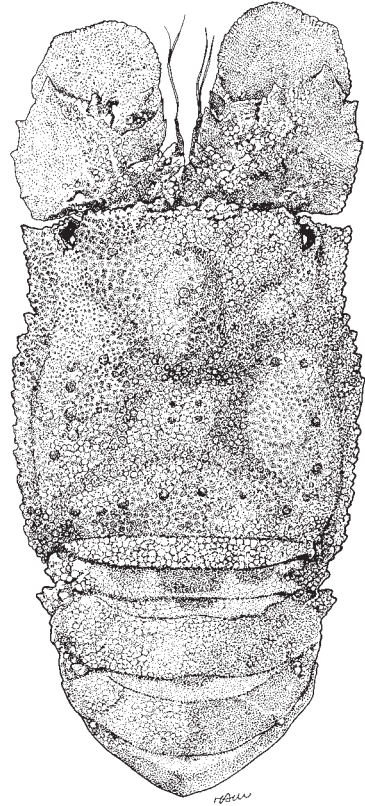
**FAO names:** En – Stump.

**Diagnostic characters:** Carapace massive, rectangular, somewhat longer than broad, flat and rough in appearance, **tubercles on upper surface sharp, distinct, interspersed with scattered short brown hairs**; certain areas of the surface somewhat elevated and separated by shallow, wide grooves; rostrum small, constricted at base, T- or inverted triangle-shaped. **Abdominal segments also covered with tubercles and pubescence similar to the carapace; segments II, III and usually IV with median longitudinal row of tubercles, slightly higher than other tubercles, giving impression of median ridge.** Antennae transformed into paddle-shaped plates, margin of distal segment entire or minutely crenulated, rounded, with blunt external angle; second-largest segment with 2 distinct teeth on anterior margin, 2 large and multiple other smaller teeth on lateral margin. **Carpus of first pereopod with large swollen hump on upper, basal portion and very shallow groove extending over this hump.** **Colour:** uniform brownish with an orange or purplish hue; **large red spot on either side of carapace, just posterior to cervical groove, at junction with branchiocardiac groove; smooth anterior part of first abdominal segment with 3 large, well-defined red spots, all similar in size, placed rather close together;** pattern of 3 spots often repeated on smooth anterior half of dorsal surface of abdominal segment II; smooth anterior part of segments III to V with small median red spot and variable number of less distinct spots laterally.

**Size:** Maximum to about 14 cm carapace length.

**Habitat, biology, and fisheries:** Found on rocky or shell substrata at depths of 9 to 100 m, usually 15 to 75 m. Individuals may migrate to deeper waters in September and October to moult. Postlarvae (pseudibacus) found over sand substrates at depths of 50 to 73 m. Fishery seasonal; carried out mostly between November and March. Of importance as a local fishery; but not caught in commercial quantities. Usually caught with traps. Marketed fresh locally and as bait for inshore fishing.

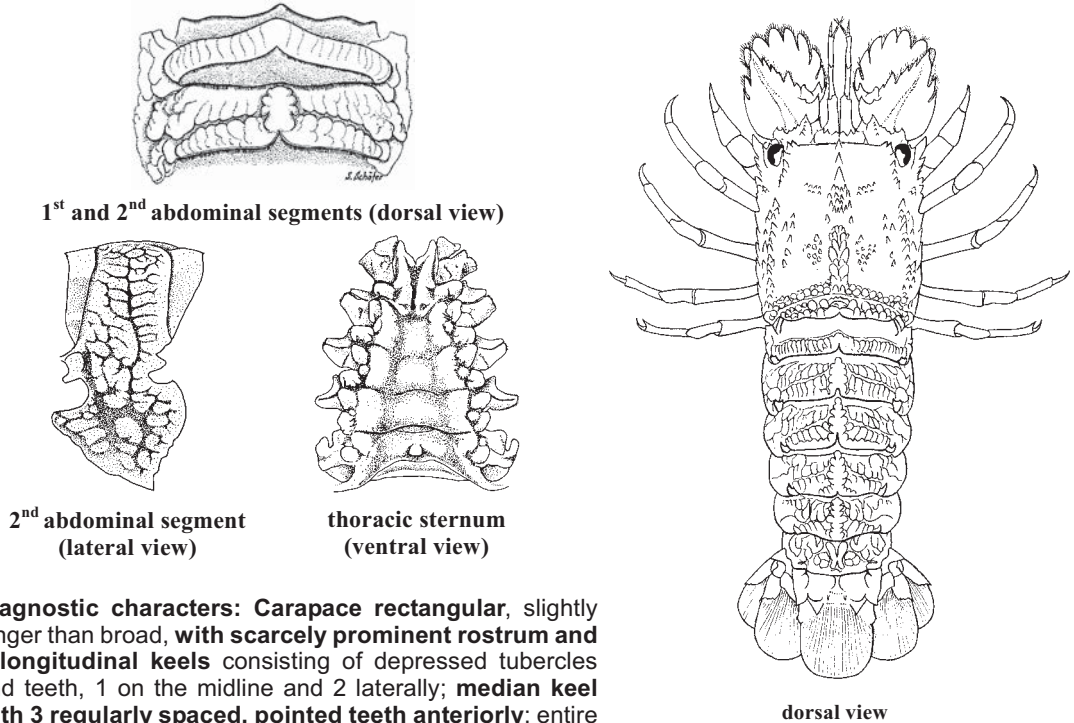
**Distribution:** Eastern Atlantic: St Helena; Gabon (?).



***Scyllarus arctus* (Linnaeus, 1758)**

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

**FAO names:** **En** – Lesser slipper lobster; **Fr** – Petite cigale; **Sp** – Santiaguño.



**Diagnostic characters:** Carapace rectangular, slightly longer than broad, with scarcely prominent rostrum and 3 longitudinal keels consisting of depressed tubercles and teeth, 1 on the midline and 2 laterally; median keel with 3 regularly spaced, pointed teeth anteriorly; entire carapace covered with short hair. Antennae considerably modified, each forming a 4-segmented paddle-shaped plate; anterior margin of distal segment divided into 7 lobes or teeth. Posterior half of abdominal segments with branched grooves that form the scale-like ornamentation of tail; anterior half of abdominal segments 2 to 6 (concealed when abdomen is stretched out) perfectly smooth. Thoracic sternum with V-shaped notch anteriorly (see figure). A blunt and low median tubercle, somewhat flattened posteriorly, on the last thoracic segment. **Colour:** carapace and abdomen showing various shades of reddish brown, with dark brown hairs; dark brown, not sharply delimited, spot in the central portion of first abdominal segment; walking legs with dark blue bands.

**Size:** Maximum: 16 cm; commonly 5 to 10 cm.

**Habitat, biology, and fisheries:** Found on muddy and rocky substrata and in eel-grass beds, usually at depths between 4 and 50 m; rarely reported from beyond 100 m depth. Nocturnal; seeks shelter in dark places during day, often in groups of several animals. Oviparous females found from February to April. More abundant than *Scyllarides latus* along the Moroccan coast. Only of minor commercial importance because of its small size. No special fishery, usually taken as bycatch in other fisheries. Taken with gillnets, trawls, dredges, traps, seines and by hand. Marketed fresh locally.

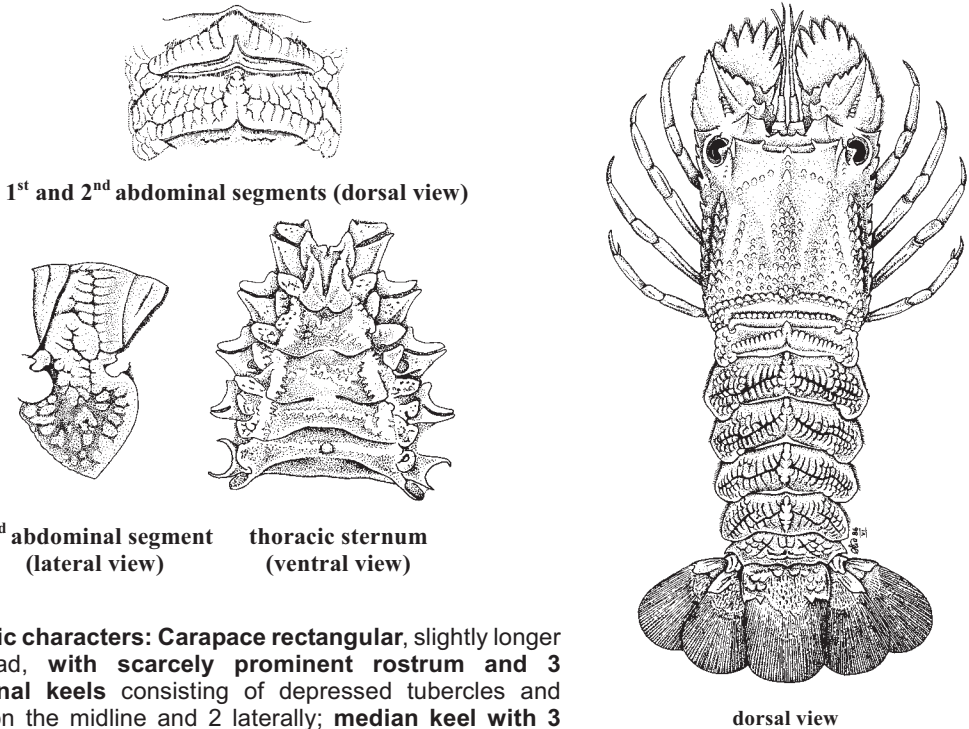
**Distribution:** Eastern Atlantic: Off Madeira, the Canary Islands and along the Atlantic coast of Morocco as far south as Agadir; the Azores, throughout the Mediterranean (but not in the Black Sea) and along the Atlantic coast of Europe to the English Channel.



***Scyllarus pygmaeus* (Bate, 1888)**

**Frequent synonyms / misidentifications:** *Arctus immaturus* Bate, 1888; *Scyllarus immaturus* Bouvier, 1912 / None.

**FAO names:** En – Pygmy locust lobster; Fr – Cigale naine; Sp – Cigarra enana.



**Diagnostic characters:** Carapace rectangular, slightly longer than broad, with scarcely prominent rostrum and 3 longitudinal keels consisting of depressed tubercles and teeth, 1 on the midline and 2 laterally; median keel with 3 regularly spaced, pointed teeth anteriorly; entire carapace covered with short hair. Antennae considerably modified, each forming a 4-segmented paddle-shaped plate; anterior margin of distal segment divided into 7 lobes or teeth. Posterior half of abdominal segments with branched grooves that form the scale-like ornamentation of tail; either side of smooth anterior half of abdominal segments 2 to 6 (concealed when abdomen is stretched out) with short transverse groove implanted with hairs. Thoracic sternum with U-shaped notch anteriorly (see figure). A blunt, low, conical median tubercle, on the last thoracic segment. **Colour:** pale brownish or pinkish with patches of darker hairs; 2 dark spots on dorsal surface of first abdominal segment in submedian region.

**Size:** Maximum 6 cm; commonly to 4 cm.

**Habitat, biology, and fisheries:** Found at depths between 5 and 150 m. Ovigerous females occur in June and August. Of no commercial importance. No special fishery, usually taken as bycatch in other fisheries. Reports that this species is fished for and marketed fresh in Sardinia should be considered with caution; this information is possibly based on *Scyllarus arctus*, not *S. pygmaeus*.

**Distribution:** Eastern Atlantic: Morocco, Madeira, Canary and Cape Verde Islands; throughout the Mediterranean (but not yet reported from the North African coast east to Morocco).

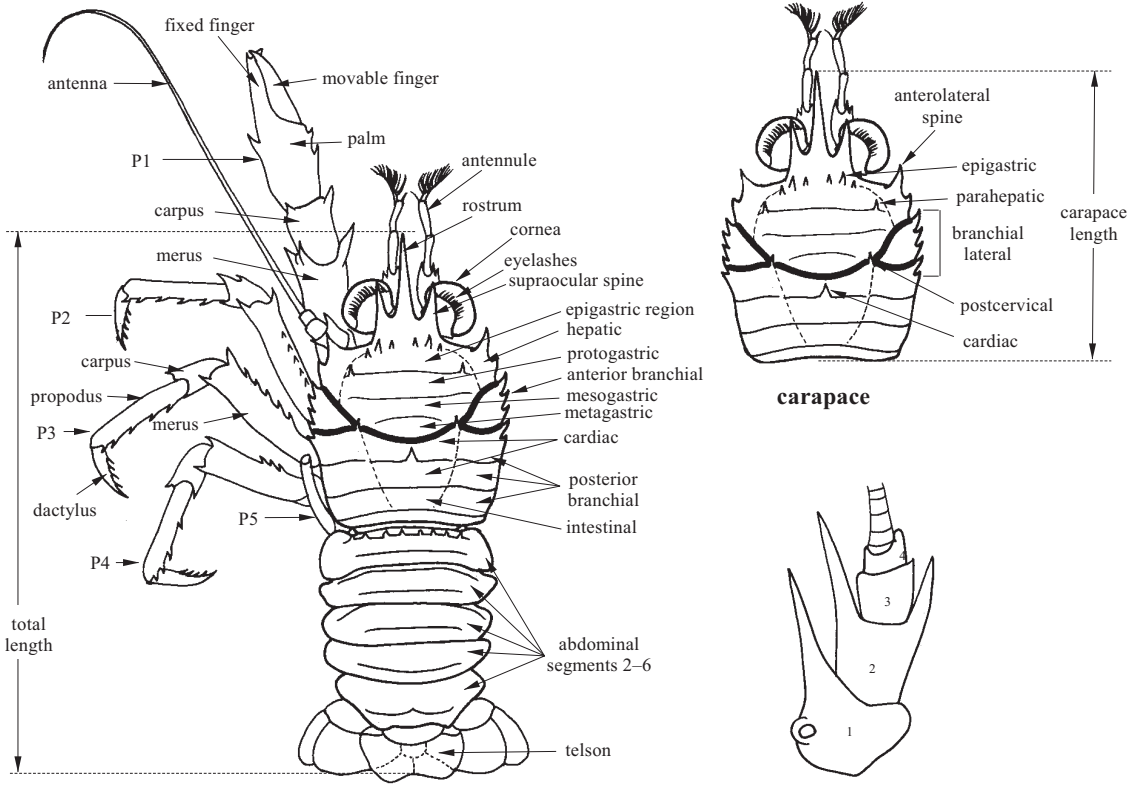


# **ANOMURANS**

by Charles H.J.M. Fransen

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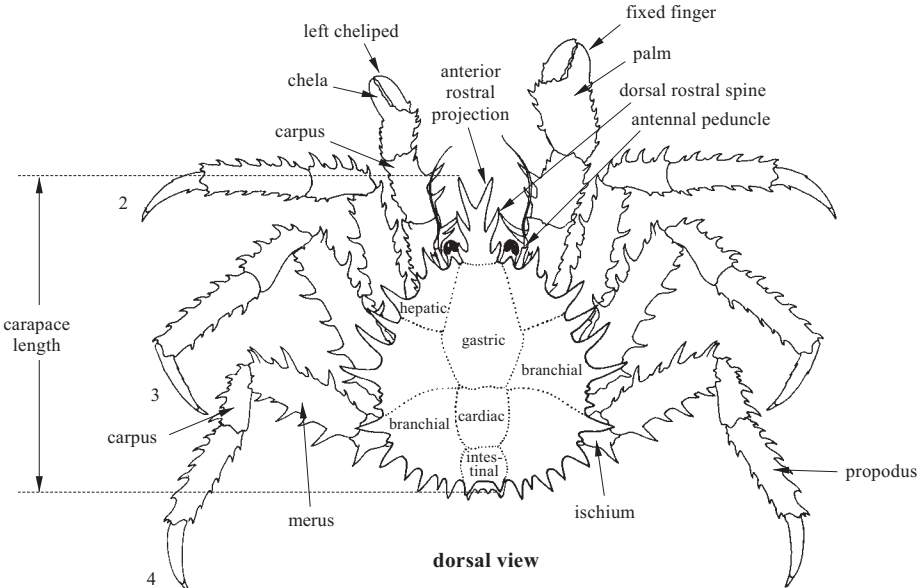
### TECHNICAL TERMS AND MEASUREMENTS



dorsal view

antennal peduncle

### Galatheidae (*Munida*)



dorsal view

### Lithodidae

**GENERAL REMARKS**

The group named Anomura or Anomala (also known as Anomuran crabs) is characterized by an abdomen which is not or loosely folded under the cephalothorax. The last pair of legs is often hidden inside the gill chamber, under the carapace, and is used for keeping the gills clean. The group is very diverse. There are 'crab-like' families like the Hippidae, Porcellanidae and Lithodidae, and 'lobster-like' groups like the Galatheidae and Chirostyliidae. There are several families living inside gastropod shells like the Diogenidae, Coenobitidae, Paguridae and Parapaguridae.

The systematics of the group is rather confusing. At present 17 families comprising almost 2 500 species are recognized of which 10 are present in the area.

Few species in the area are of (potential) interest to fisheries.

**KEY TO FAMILIES OCCURRING IN THE AREA**

- 1a. Legs 2 to 4 with dactylus strongly hooked and flattened (Fig. 1); abdomen strongly reduced, always folded under thorax . . . . . **Hippoidea** → 2
- 1b. Legs 2 to 4 with dactylus normal, not strongly hooked nor flattened; abdomen well developed, folded under thorax in few species. . . . . → 3
- 2a. First leg ending in pseudochela; carapax compressed dorsoventrally (Fig. 1) . . . . . **Albuncidae**
- 2b. First leg simple, without chela or pseudochela; carapace subcylindrical (Fig. 2) . . . . . **Hippidae**

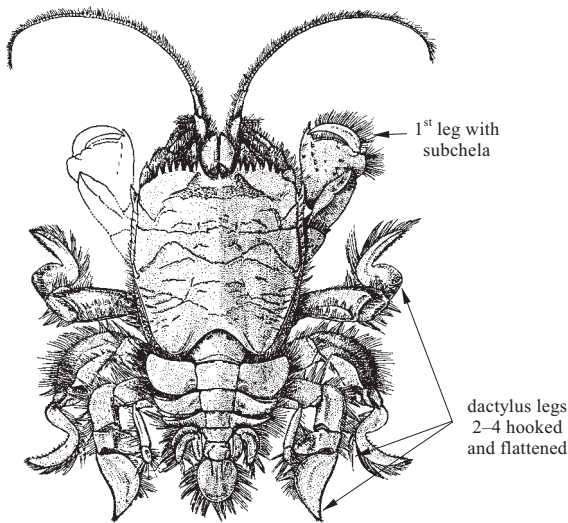


Fig. 1 *Albunea carabus*

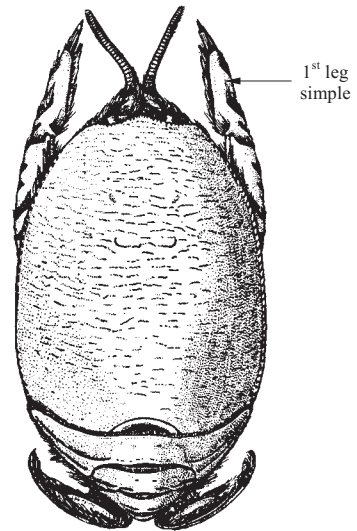


Fig. 2 *Hippa cubensis*

- 3a. Abdomen asymmetrical, not clearly divided into segments, generally membranous, uropods modified to maintain contact with gastropod shell or absent (Lithodidae) (Figs 5 and 6) . . . . . **Paguroidea** → 4
- 3b. Abdomen symmetrical and clearly divided into calcified segments; uropods normal, well developed, used for swimming (Figs 9 to 11) . . . . . **Galatheoidea** → 8

- 4a. Basis of third maxillipeds close together (Fig. 3a); chelipeds subequal or left cheliped much stronger developed than right cheliped (seldom right cheliped stronger than left) . . . . . → 5
- 4b. Basis of third maxillipeds clearly separated (Fig. 3b); right cheliped generally stronger developed than left cheliped, sometimes subequal (left never stronger than right) . . . . . → 6

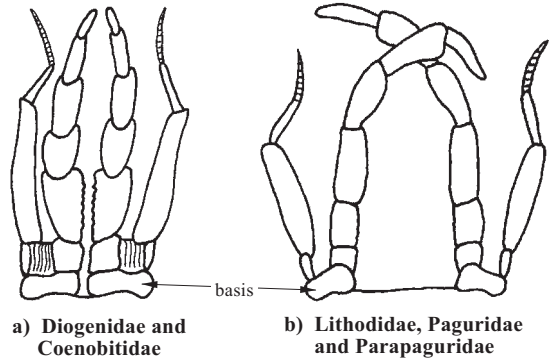


Fig. 3 third maxillipeds

- 5a. Eyestalk compressed laterally with an excavation on the inner side near its base (Fig. 4a) only one terrestrial species present in the area) . . . . . **Coenobitidae**
- 5b. Eyestalk cylindrical or sub-cylindrical (Fig. 4b) . . . . **Diogenidae**
- 6a. Carapace spiny, strongly calcified; rostrum spine-like; legs 2, 3 and 4 well developed, fifth reduced (Fig. 5). . . . . **Lithodidae**
- 6b. Carapace not spine, only calcified in anterior part, posterior part membranous; rostrum small or absent; second and third legs well developed, fourth and fifth reduced (Fig. 6). . . . . → 7

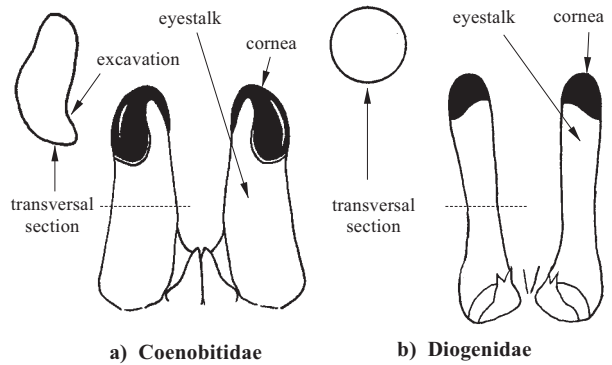


Fig. 4 dorsal view of eyes

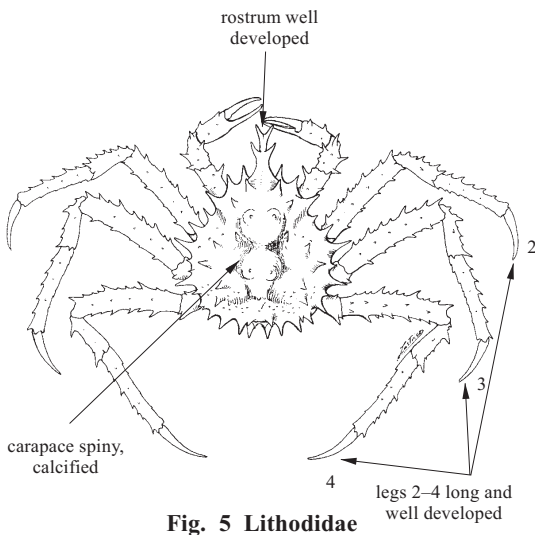


Fig. 5 Lithodidae

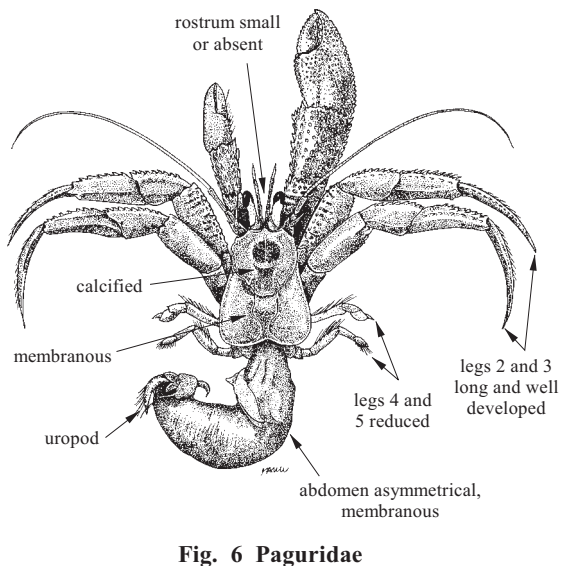
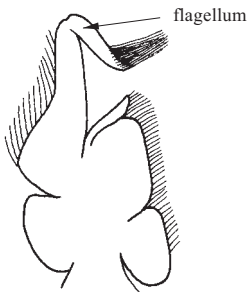


Fig. 6 Paguridae

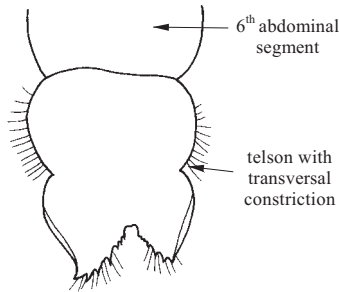


- 7a. First maxilliped with flagellum (Fig. 7); telson with a medial transversal constriction (Fig. 8a) . . . . . **Paguridae**
- 7b. First maxilliped without flagellum; telson without median transversal constriction (Fig. 8b) . . . . . **Parapaguridae**



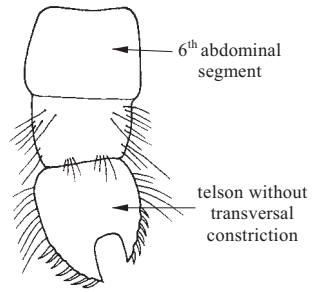
Paguridae

Fig. 7 first maxilliped



a) Paguridae

Fig. 8 posterior part of abdomen



b) Parapaguridae

- 8a. Rostrum short, reduced or absent; body 'crab-shaped' with oval or circular carapace; abdomen always folded under thorax (Fig. 9) . . . **Porcellanidae**
- 8b. Rostrum well developed, extending beyond eyes; body 'lobster-shaped'; abdomen used for swimming (Figs 10 and 11) . . . . . → 9

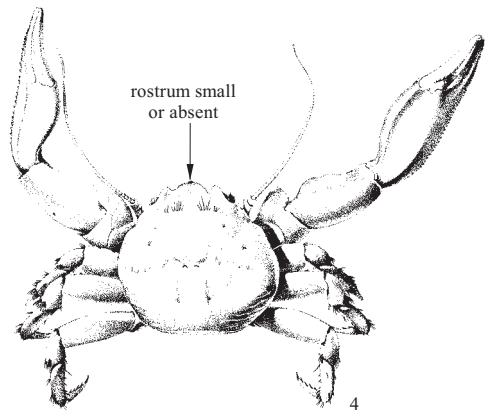


Fig. 9 Porcellanidae

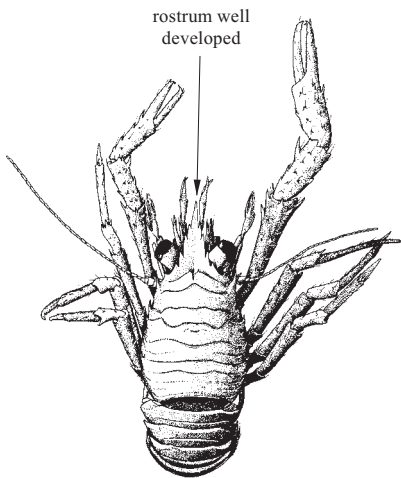


Fig. 10 Galatheidae

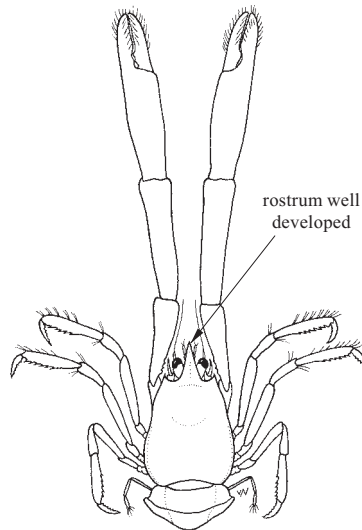


Fig. 11 Chirostylidae

- 9a. Telson subdivided in 2 or more plates (Fig. 12a); antennal peduncle consisting of 4 movable segments (Fig. 13a) . . . . . **Galatheidae**
- 9b. Telson entire, not subdivided (Fig. 12b); antennal peduncle consisting of 5 movable segments (Fig. 13b) . . . . . **Chirostylidae**

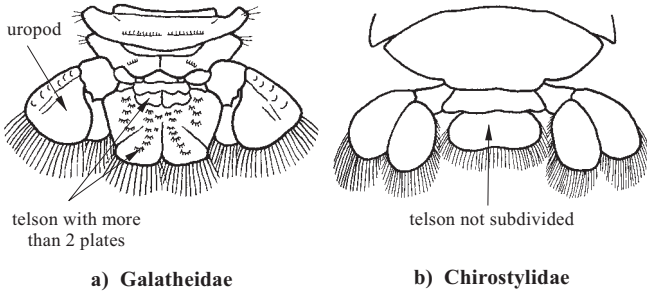


Fig. 12 telson and uropods

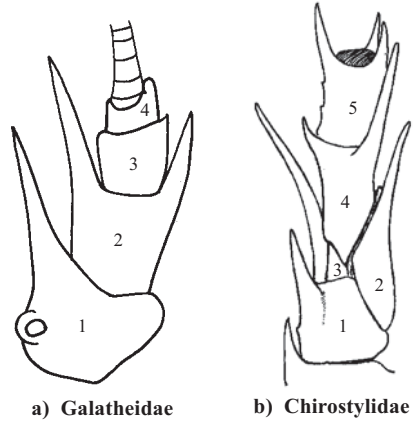




Fig. 13 antennal peduncle

**LIST OF SUPERFAMILIES AND FAMILIES OCCURRING IN THE AREA**

Classification according to Martin & Davis, 2001

The symbol  is given for those families which are treated further in this contribution. Of these groups the species are listed under those sections.


**Infraorder ANOMURA** MacLeay, 1838.  
**Superfamily GALATHEOIDEA** Samouelle, 1819.

- CHIROSTYLIDAE Ortmann, 1892.
-  GALATHEIDAE Samouelle, 1819.
- PORCELLANIDAE Haworth, 1825.

**Superfamily HIPPOIDEA** Latreille, 1825.

- ALBUNEIDAE Stimpson, 1858.
- HIPPIDAE Latreille, 1825.

**Superfamily PAGUROIDEA** Latreille, 1802.

- COENOBITIDAE Dana, 1851.
- DIOGENIDAE Ortmann, 1892.
-  LITHODIDAE Samouelle, 1819.
- PAGURIDAE Latreille, 1802.
- PARAPAGURIDAE Smith, 1882.

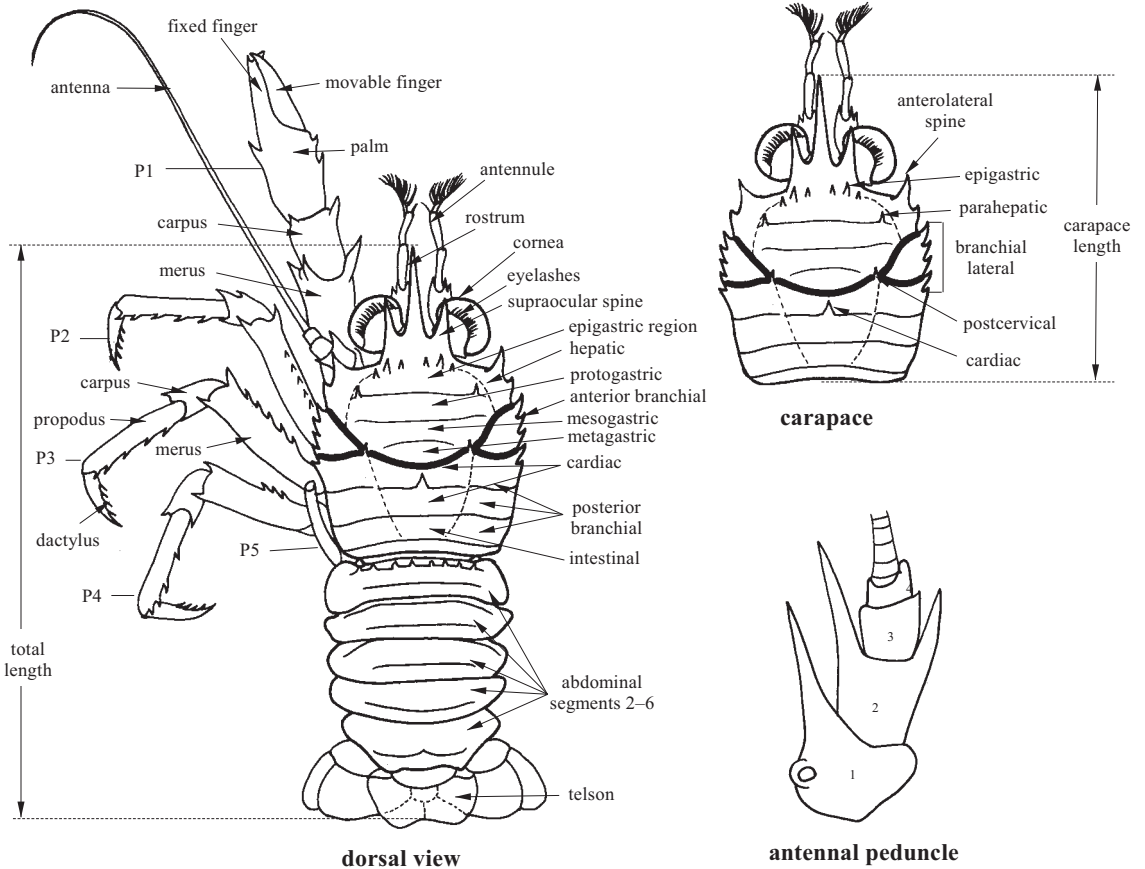
**Infraorder ANOMURA**

**Superfamily GALATHEOIDEA**

**GALATHEIDAE**

**Squat lobsters**

**Diagnostic characters:** Body elongate when abdomen unfolded, looking like a small lobster. **Rostrum** well developed, subtriangular or spiniform, extending beyond eyes. **Eyestalk** consists of 3 articulating segments. **Antennal peduncle** with 4 segments. **First legs** elongate, symmetrical, with well developed pincers; second to fourth legs with normal dactylus, not strongly recurved or flattened. **Abdomen** well developed, symmetrical, clearly divided into segments. **Uropods** well developed; **telson** subdivided in two or more plates.

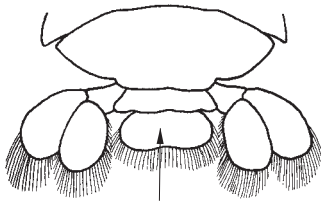


**Galatheidae (*Munida*)**

**Habitat, biology, and fisheries:** All members of the Galatheidae are marine, occurring in shallow coastal waters to the deep sea. Most species are benthic. Three genera are present in the area: *Galathea*, *Munidopsis* and *Munida*. One species of *Munida* (*M. rutilanti*) has potential for fisheries as it is of reasonable size and can be caught in large quantities.

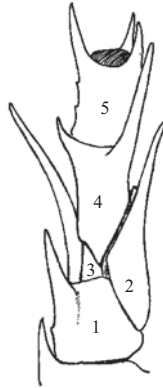
**Similar families occurring in the area**

Chirostylidae: antennal peduncle consisting of 5 segments; telson entire, not divided in two or more plates.



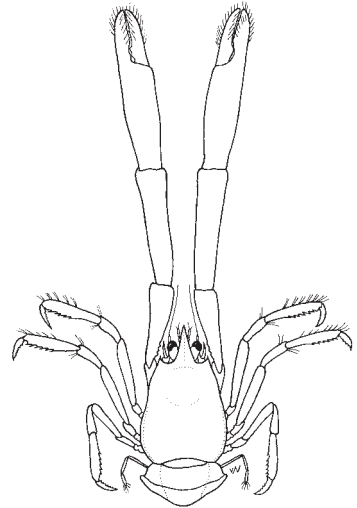
telson not subdivided

**telson and uropods (unfolded) in dorsal view**



**antennal peduncle**

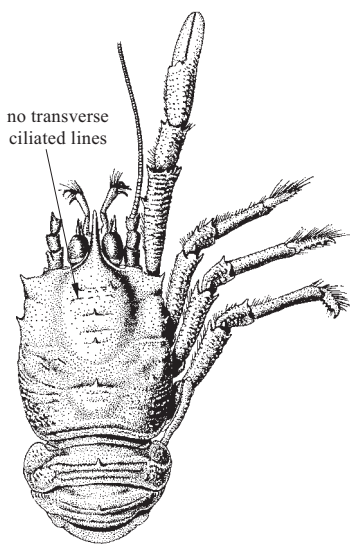
**Chirostylidae**



**dorsal view**

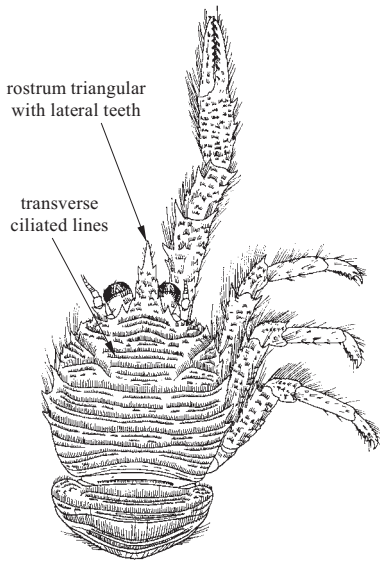
**Key to the genera of Galatheidae occurring in the area**

- 1a. Transverse ciliated lines on carapace well developed (Figs 2 and 3); exopodite of first maxilliped with flagellum; eyes well developed . . . . . → 2
- 1b. Transverse ciliated lines on carapace absent or poorly developed (Fig. 1); exopodite of first maxilliped without flagellum; eyes reduced or poorly developed . . . . . **Munidopsis**
- 2a. Rostrum a triangular plate with denticles along lateral margins (Fig. 2); species common in depths between 0 and 100 m . . . . . **Galathea**
- 2b. Rostrum a long spine bordered on both sides by a shorter spine (supraocular tooth or spine) (Fig. 3); species common in depths between 100 and 1 000 m . . . . . **Munida**



no transverse ciliated lines

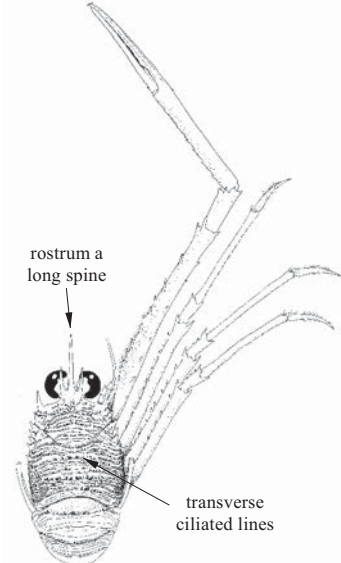
**Fig. 1 Munidopsis**



rostrum triangular with lateral teeth

transverse ciliated lines

**Fig. 2 Galathea**




rostrum a long spine

transverse ciliated lines

**Fig. 3 Munida**

**List of species occurring in the area**

The symbol  is given when species accounts are included.

*Galacantha subrostrata* Macpherson, 2007<sup>1/</sup>.

*Galathea agassizi* A. Milne Edwards, 1880<sup>2/</sup>.

*Galathea capillata* Miyake and Baba, 1970.

*Galathea dispersa* Bate, 1859.

*Galathea faiali* Nunes-Ruivo, 1961.

*Galathea intermedia* Lilljeborg, 1851.

*Galathea machadoi* Barrois, 1888.

*Galathea nexa* Embleton, 1834.

*Galathea rufipes* A. Milne Edwards and Bouvier, 1894.

*Galathea squamifera* Leach, 1814.

*Galathea strigosa* (Linnaeus, 1761).

*Galathea venusta* Miyake and Baba, 1970.

*Galathea wolffi* Miyake and Baba, 1970.

*Munida benguela* de Saint Laurent and Macpherson, 1988.


*Munida curvimana* A. Milne Edwards and Bouvier, 1894.

*Munida guineae* Miyake and Baba, 1970.

*Munida intermedia* A. Milne Edwards and Bouvier, 1899.

*Munida microphthalma* A. Milne Edwards, 1880.

*Munida rugosa* (Fabricius, 1775).

 *Munida rullanti* Zariquiey Álvarez, 1952.

*Munida sanctipauli* Henderson, 1885.

*Munida sarsi* Huus, 1935.

*Munida speciosa* von Martens, 1878.

*Munida subcaeca* Bouvier, 1922.

*Munida tenuimana* Sars, 1872.

*Munida tropicalis* A. Milne Edwards and Bouvier, 1897.

*Munidopsis acuta* (A. Milne Edwards, 1881).

*Munidopsis acutispina* Benedict, 1902.

*Munidopsis bispinata* Miyake and Baba, 1970.

*Munidopsis chunii* Balss, 1913.

*Munidopsis crassa* Smith, 1885.

*Munidopsis curvirostra* Whiteaves, 1874.

*Munidopsis gladiola* Macpherson, 2007.

*Munidopsis hirtella* Macpherson and Segonzac, 2005.

*Munidopsis livida* (Perrier, 1886).

*Munidopsis nitida* (A. Milne Edwards, 1880).

*Munidopsis parfaiti* (Filhol, 1885).

*Munidopsis polymorpha* Koelbel, 1892.

*Munidopsis rostrata* (A. Milne Edwards, 1880)<sup>3/</sup>.

*Munidopsis serricornis* (Lovén, 1852).

*Munidopsis subsquamosa* Henderson, 1885.

*Munidopsis talismani* A. Milne Edwards and Bouvier, 1894.

<sup>1/</sup> Species described and genus reestablished after submission of this manuscript.

<sup>2/</sup> Placed in *Leiogalathea* by Baba *et al.*, 2008.

<sup>3/</sup> Placed in *Galacantha*, reestablished by Macpherson in 2007.

- Munidopsis thieli* Türkay, 1975.  
*Munidopsis tropeorhyncha* Miyake and Baba, 1970.  
*Munidopsis truculenta* Macpherson and Segonzac, 2005.  
*Munidopsis vaillantii* (A. Milne Edwards, 1881).

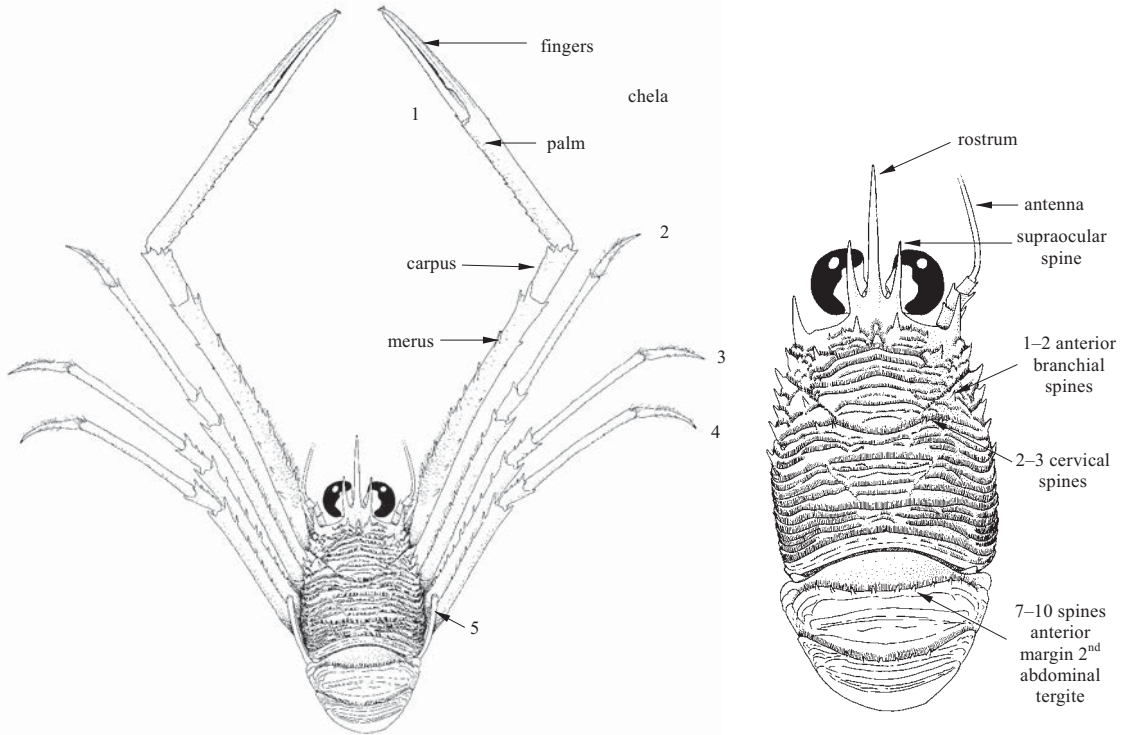
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***Munida rutllanti*** Zariquiey Alvarez, 1952

**Frequent synonyms / misidentifications:** *Munida iris rutllanti* Zariquiey Alvarez, 1952 / *Munida iris* – Miyake and Baba, 1970.

**FAO names:** En – Rutllants squat lobster; Fr – Galatée de Rutllant; Sp – Munida de Rutllant.



**Diagnostic characters:** Pilosity of body and legs iridescent. Carapace without cardiac or protogastric spines, with 1 or 2 anterior branchial spines and 2 or 3 cervical spines on each side; posterior margin unarmed. Anterior margin of tergite of second abdominal segment with 7 to 10 spines. Third maxilliped usually with 2 spines on inner margin of merus, with 1 pointed spine and 3 or 4 teeth along dorsal margin. Chela of first leg 7 times longer than carpus. **Colour:** body and appendages orange to red. Rostrum and supraocular teeth white. Last 2 abdominal segments distal margin greyish. First legs with spines on inner margin white; fingers often white.

**Size:** Maximum carapace length (without rostrum): 22 mm.

**Habitat, biology, and fisheries:** Occurring on muddy bottoms in depths between 130 and 540 m. No special fisheries for this species but often caught by trawlers fishing for shrimp in similar habitats like *Aristeus antennatus* (Risso, 1816), *Aristaeomorpha foliacea* (Risso, 1827) and *Parapenaeus longirostris* (Lucas, 1846) in the western Mediterranean. Sisterspecies of the west Atlantic commercially interesting *Munida iris* Milne Edwards, 1880.

**Distribution:** East Atlantic: from northwestern Spain south to Mauritania, Canary Islands and Cape Verde Islands. Southern and southwestern part of western Mediterranean and the Aegean Sea.

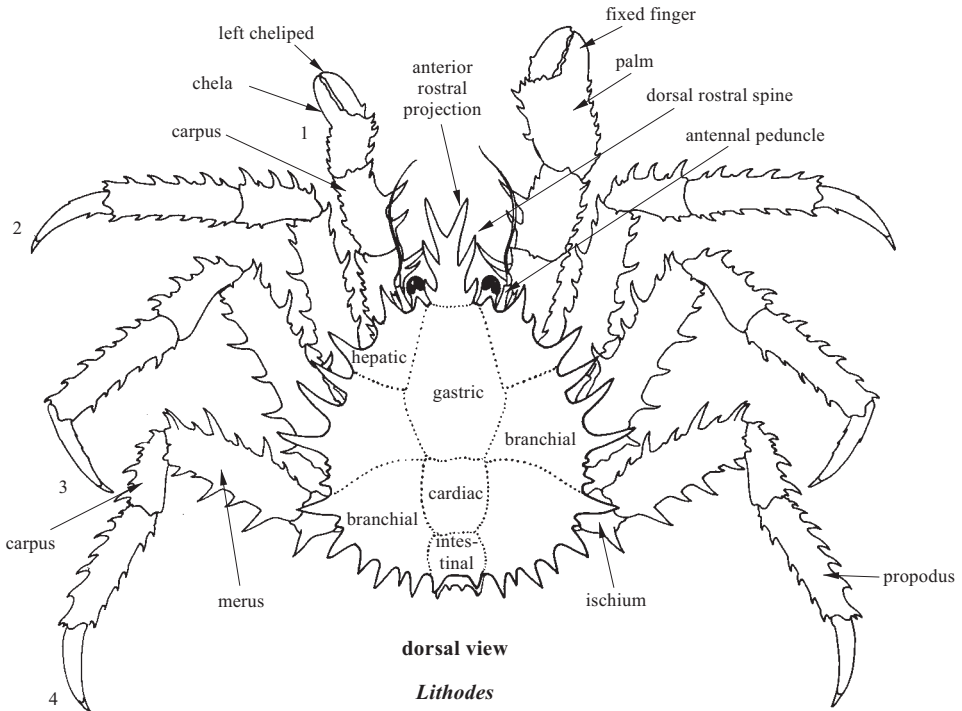


**Superfamily PAGUROIDEA**

**LITHODIDAE**

**King crabs**

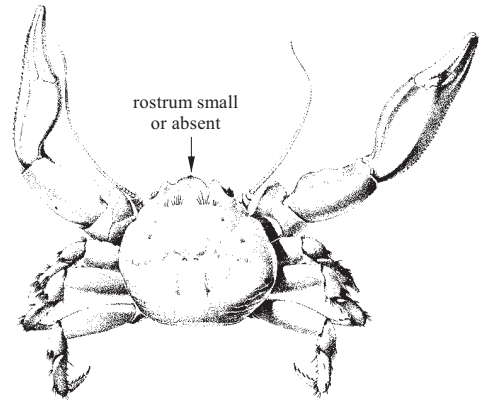
**D**iagnostic characters: **Body crab-shaped. Carapace spiny, more or less calcified, regions usually well defined; rostrum well developed, often spine-like. Basis of third maxillipeds clearly separated by large space.** First legs with pincers; right cheliped generally stronger developed than left cheliped, sometimes subequal (left never stronger than right); **second to fourth legs well developed, fifth reduced**, subchelate, usually concealed beneath carapace. **Abdomen asymmetrical** (particularly in females), membranous or with calcified plates, loosely folded beneath cephalothorax; pleopods only present under females, first pleopods paired and small; pleopods on somites 2 to 5 uniramous, present only on left side of abdomen; uropods absent; telson small.



**Habitat, biology, and fisheries:** All members of the Lithodidae are marine, occurring in shallow coastal waters to the deep sea. Species are benthic. Three genera are present in the area: *Paralomis*, *Neolithodes* and *Lithodes*. One species of *Lithodes* (*L. ferox*) is of commercial interest.

**Similar families occurring in the area**

Porcellanidae: rostrum small or absent. Carapace without spines or tubercles. Abdomen symmetrical and clearly divided into calcified segments; uropods present, well developed. Small 'crab-like' animals.

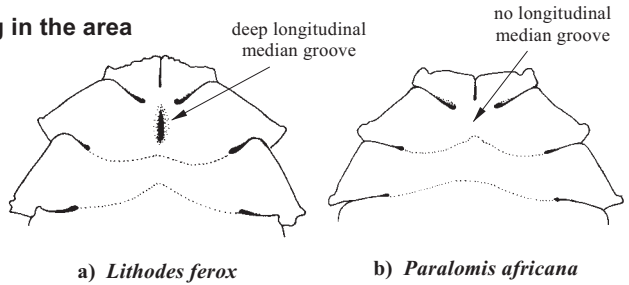


**Porcellanidae**



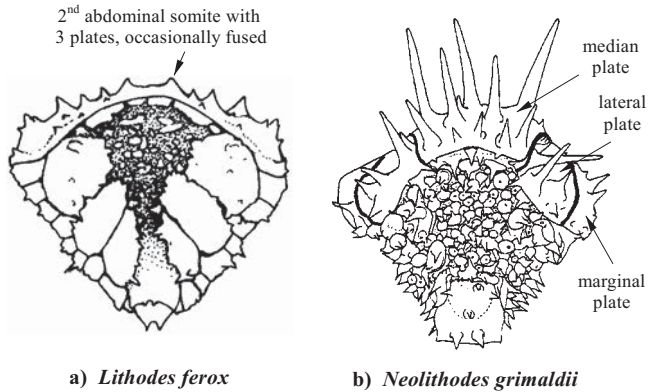
**Key to the genera of Lithodidae occurring in the area**

- 1a.** Sternite located between first pair of walking legs with a deep, longitudinal, medial groove (Fig. 1a) . . . . . → **2**
- 1b.** Sternite located between first pair of walking legs without deep, longitudinal medial groove (Fig. 1b) . . . . . **Paralomis**




**Fig. 1** anterior part of sternum


- 2a.** Second abdominal segment composed of 3 plates, occasionally fused into a single plate (Fig. 2a) . . . . . **Lithodes**
- 2b.** Second abdominal segment composed of 5 plates, one median, one lateral pair, and one marginal pair (Fig. 2b) . . . . . **Neolithodes**



**Fig. 2** abdomen (ventral view)

**List of species occurring in the area**

The symbol  is given when species accounts are included.

- Neolithodes asperrimus* Barnard, 1947.  
*Neolithodes grimaldii* (A. Milne Edwards and Bouvier, 1894).  
 *Lithodes ferox* Filhol, 1885.  
*Lithodes unicornis* Macpherson, 1984.  
*Paralomis africana* Macpherson, 1982.  
*Paralomis cristulata* Macpherson, 1988.  
*Paralomis erinacea* Macpherson, 1988.

**References**

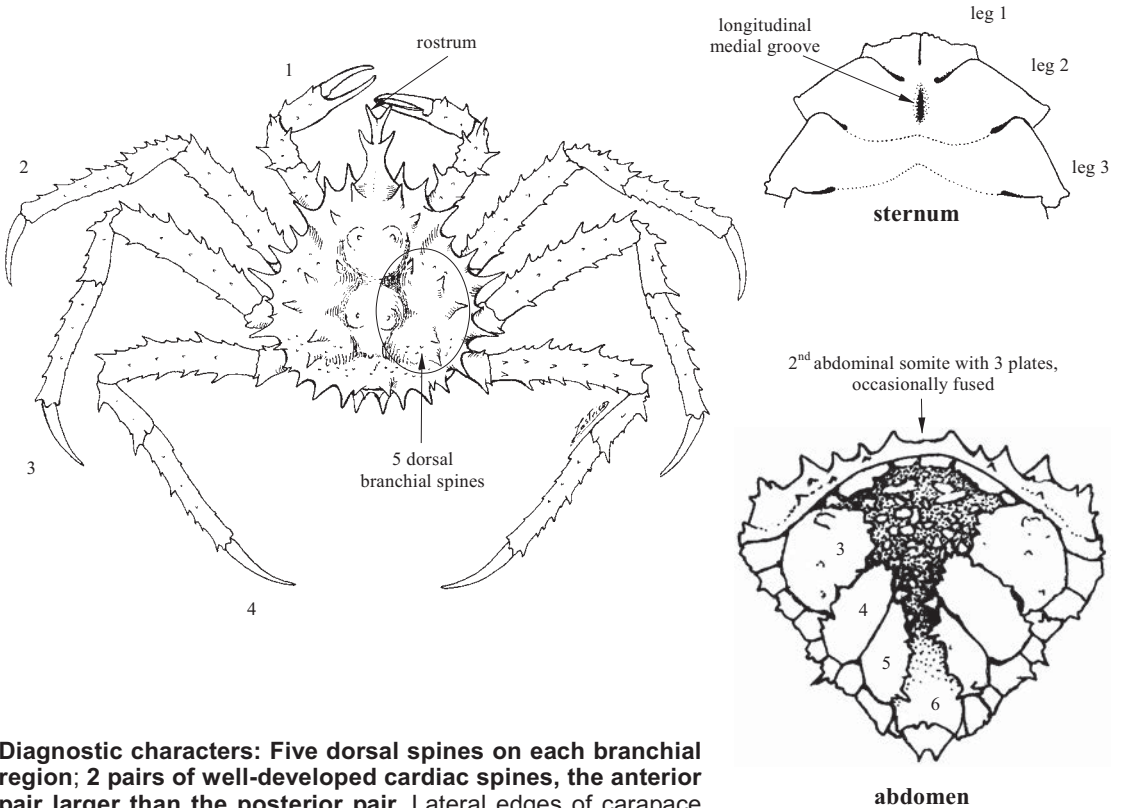
**d'Udekem d'Acoz, C.** 1999. Inventaire et distribution des crustacés décapodes de l'Atlantique nord-oriental, de la Méditerranée et des eaux continentales adjacentes au nord de 25°N. *Collection Patrimoines Naturels*, 40: i-x + 1-383. Service Patrimoine Naturel, Muséum National d'Histoire Naturelle, Paris.

**Macpherson, E.** 1988. Revision of the family Lithodidae Samouelle, 1819 (Crustacea, Decapoda, Anomura) in the Atlantic Ocean. *Monografías de Zoología Marina*, 2: 9-153.

***Lithodes ferox*** Filhol, 1885

**Frequent synonyms / misidentifications:** *Lithodes murrayi* Kensley, 1980; *Pseudolithodes pyriformis* Birstein and Vinogradov, 1972 / None.

**FAO names:** En – King crab; Fr – Crabe royal; Sp – Centolla.



**Diagnostic characters:** Five dorsal spines on each branchial region; 2 pairs of well-developed cardiac spines, the anterior pair larger than the posterior pair. Lateral edges of carapace armed with some well-developed spines. Anterior projection of rostrum long, slanting slightly upwards, concealing basal spine. Sternal plate between second legs with deep longitudinal, medial groove. Second abdominal somite with 3 plates, occasionally fused to one plate. **Colour:** carapace, chelipeds, and walking legs all a darker red than the spines. Some specimens may exhibit orange or pink tones.

**Size:** Maximum carapace length in males 14 cm, in females 11 cm. Females ovigerous from 6.9 cm.

**Habitat, biology, and fisheries:** Occurs on muddy bottoms in depths between 160 and 1 013 m, highest densities between 400 and 500 m. Probably migrating as bathymetric differences in size and sex distributions were observed. Of commercial importance off Namibia.

**Distribution:** East Atlantic: Off western Africa between 22°N and 28°S, St Helena. West Atlantic: off Brazilian coast.

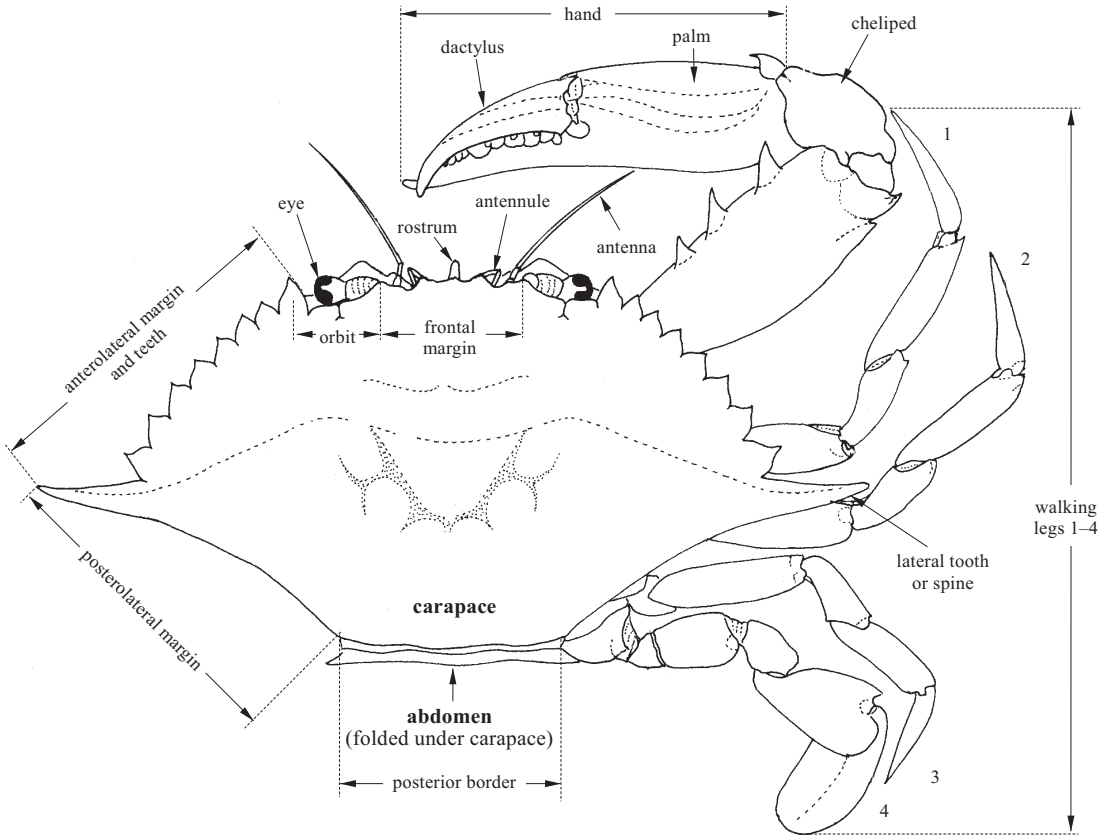


# **TRUE CRABS**

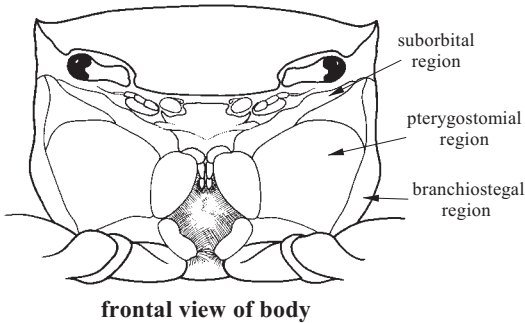
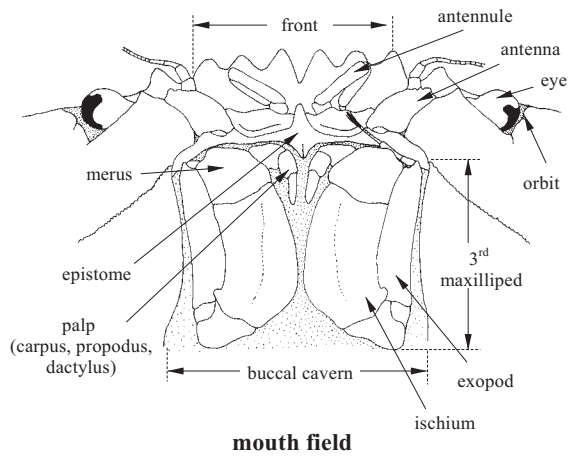
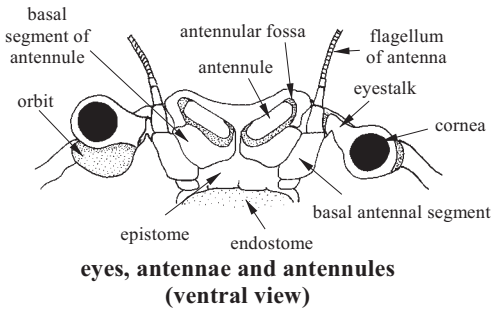
by Charles H.J.M. Fransen

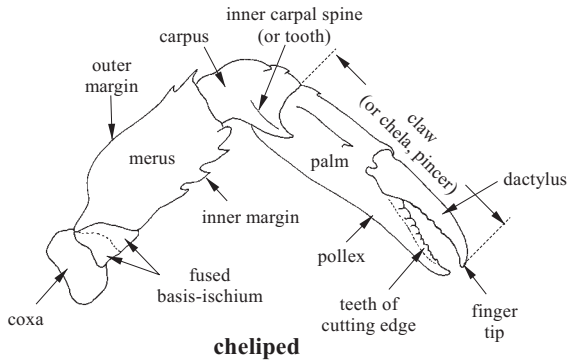
Department of Marine Zoology, Netherlands Centre for Biodiversity – Naturalis, Leiden, The Netherlands

### TECHNICAL TERMS AND MEASUREMENTS

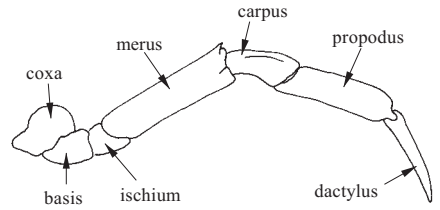


general shape (dorsal view) of a brachyuran crab (family Portunidae)

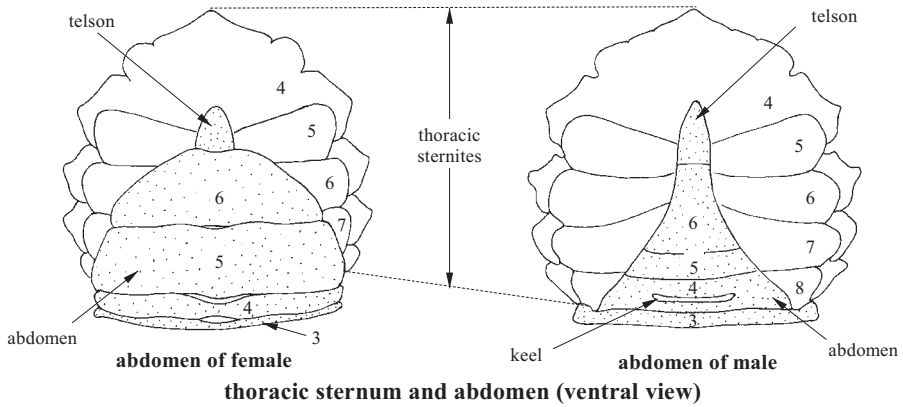




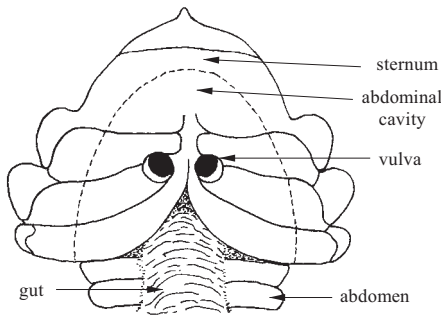
**cheliped**



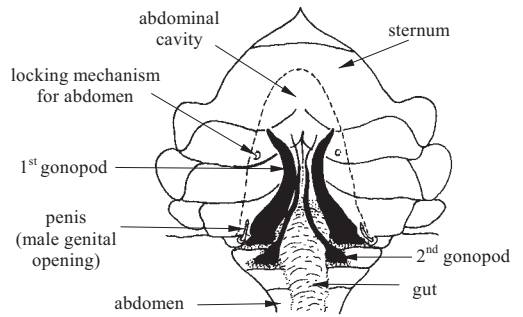
**walking leg**



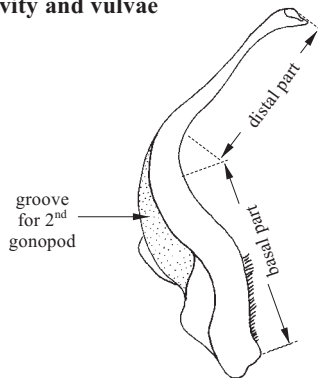
**thoracic sternum and abdomen (ventral view)**



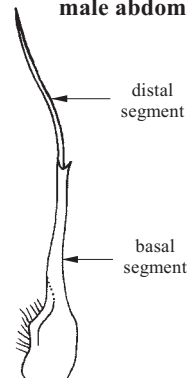
**female abdominal cavity and vulvae**



**male abdominal cavity and gonopods**



**first gonopod**



**second gonopod**

**male gonopods**

## GENERAL REMARKS

The true crabs (order Decapoda, infraorder Brachyura) have a depressed carapace or cephalothorax and a much reduced, straight and symmetrical abdomen which is closely bent under the cephalothorax; this abdomen is never used for swimming and usually lacks uropods (when present, these are never biramous); in the female, during the spawning season, the eggs are attached to the abdominal appendages (berried crabs). The cephalothorax has 5 pairs of walking legs, the first of which is chelate (ending in pincers) and nearly always much stronger than the other legs. There are a number of true crabs which have their fourth pair of legs greatly reduced (e.g. Dynomenidae) like in the 'false crabs' of the infraorder Anomura, or even completely reduced (Hexapodidae).

True crabs are widely distributed, occurring in marine, brackish and fresh waters from the equator to the polar regions. The majority of the marine species occur in shallow and moderately deep water, however, many species are found in the deep sea as well. Almost all species are benthic, living on a large variety of bottoms such as rock, mud, peat, sand, fragments of shells or mixtures of these materials. Few species live in association with other invertebrates like corals, worms or molluscs.

Altogether there are over 6 700 species of true crabs. In Fishing Area 34 and part of 47, a total number of 281 species has thus far been recorded. Species in Fishing Area 34 and part of 47 which contribute substantially to commercial fisheries or may occasionally be found in them, belong to 12 families. Most of the species are of little economic value and almost all are only of local interest.

The classification of the Brachyura is still not settled. For the purpose of this guide, the classification proposed by Martin and Davis (2001) has been followed. In the final stage of the preparation of this guide the 'Systema Brachyurorum' Ng *et al.* (2008) was published with several changes, especially in the higher classification.

### Characters useful for identification (after Ng, 1998)

The teeth of the anterolateral margins of the carapace are also known as the epibranchial teeth. The first anterolateral tooth is often called the "external orbital" or "exo-orbital" angle (or tooth) and is counted separately from the following anterolateral teeth by many authors. The frontal margin (or front) becomes elongate and/or spiniform in many crabs such as the homolids (deep-water porter crabs) and majids (spider crabs) and is then frequently called a rostrum.

The maximum carapace width is used as principal measurement indicating the size of a crab, measured as the greatest distance between the lateral margins of the carapace.

The buccal cavern (location of the mouthparts), is bordered on both sides by the pterygostomial regions and above by the epistome. The calcareous plate inside the buccal cavern is called the endostome. Usually, only the anterior part of the endostome is visible, even when the mouthparts are moved aside. The outer mouthparts or third maxillipeds are often just referred to as "the mouthparts", even though there are actually 6 pairs of feeding appendages. The second maxillipeds and first maxillipeds are normally located underneath the third maxillipeds in life. Two smaller feeding appendages are situated below the 3 pairs of maxillipeds: the first maxilla (or maxilla) and second maxilla (or maxillules). Finally, the mouth is bordered by a pair of well-calcified, jaw-like and highly modified appendages, the mandibles.

The 5 pairs of locomotory appendages of a crab (the pereopods) are made up of a pair of usually powerful chelipeds (legs carrying a chela or pincer) and normally of 4 pairs of walking (or ambulatory) legs. For the present contribution, the first appendage is referred to as the cheliped and the last 4 appendages (walking legs) as legs. The claw (or chela) itself consists of a palm (or manus) and 2 fingers, one of which is movable (the dactylus or movable finger), whereas the other one (pollex) is fixed. The tips or edges of the fingers may be pectinated. In some families the last pair or all walking legs are modified for swimming or burrowing, as seen in the Portunidae and the Matutidae. Adult male and female crabs are easily distinguished by the shape of their abdomen. In males, the abdomen is triangular to broadly T-shaped, whereas in females it is broad, usually semicircular, often covering most of the ventral surface. Almost all crabs have 7 abdominal segments (although the seventh segment or telson is actually not a true segment), but in a number of families, several segments are partially or completely fused. This fusion may be complete (i.e. with the sutures between segments no longer visible) or

incomplete (i.e. with parts of the sutures still present or obscure). In both cases, however, the segments are immovable.

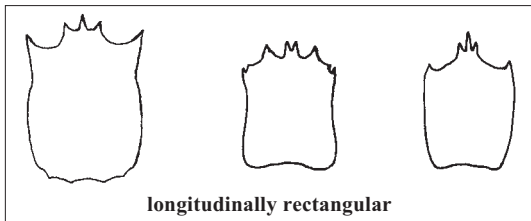
Many crab species show a sexual dimorphism, with the males usually being larger or possessing special or excessively developed structures. In some species, however, it is the female which grows larger. Males possess 2 pairs of gonopods, that is, modified pleopods specifically adapted for copulation (most crabs practice internal fertilization). The pleopods (abdominal appendages) of females are branched, setose and serve to carry the eggs: fertilized eggs are exuded, attached to the setose pleopods of females, and kept there for several weeks until the planktonic larvae (zoeae) hatch out. The larvae pass several stages before they finally metamorphose to a young crab.

Many species of crabs possess pubescence to varying degrees on their body and appendages. The hair (or more appropriately called setae) may be soft or stiff, simple or plumose (plume-like), or so short that it becomes pile-like, sometimes even short and dense, giving a velvet-like appearance. The setae may sometimes be hard and spine-like, especially on the propodus and dactylus of legs. Unlike real spines, however, those stiff setae are never calcareous. Majids often possess hook-like setae that attach to sponges, algae and debris (similar in action to velcro), supporting the camouflage of the crab. In other species, the longer and/or plumose setae gather dirt and mud in order to obscure the animal's outline. Most of the softer setae on the legs and chelae have a sensory function.

**Carapace types** (after Ng, 1998)

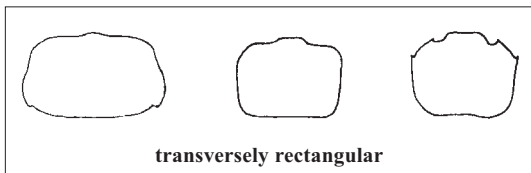
The shape of the carapace is often used as a descriptive character in many guides and keys. Unfortunately, a large variety of terms have been introduced in the past, not always applied with exactly the same meaning. Therefore, an approximate categorization has been provided here and those carapace types which belong to a respective category are illustrated below. It should be remembered, however, that there are sometimes no clear lines separating the different carapace types, and so the designation of a particular type may be somewhat subjective in certain cases. Nevertheless, the use of carapace shapes is still a useful character in many instances.

The carapace types utilized here are shown in Figures A to N.



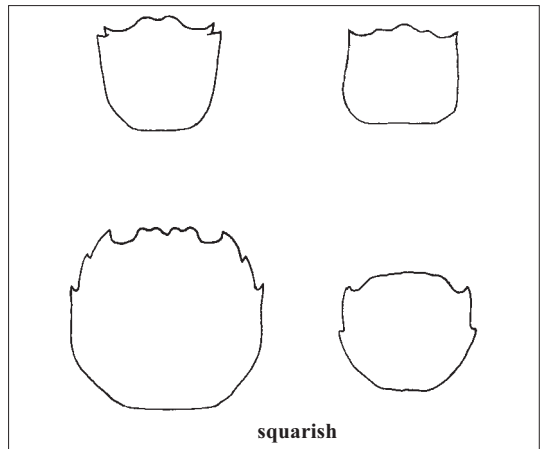
longitudinally rectangular

**Figure A**



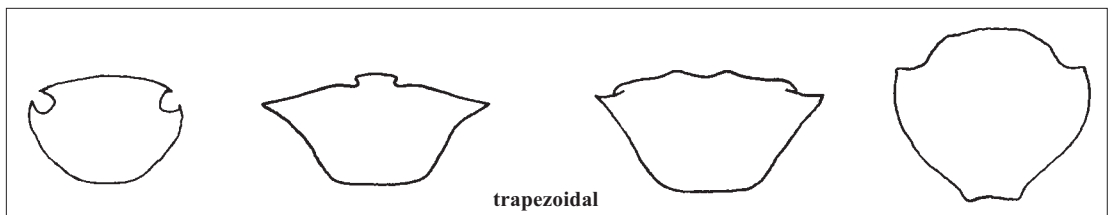
transversely rectangular

**Figure B**



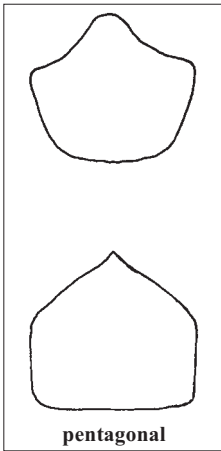
squarish

**Figure C**



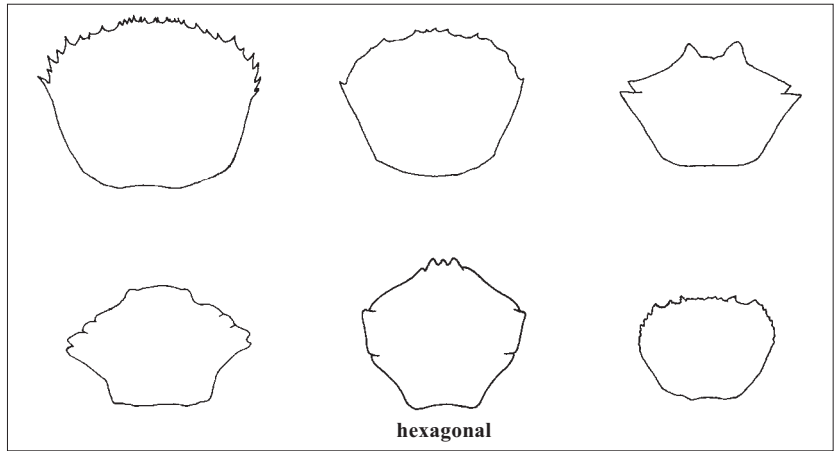
trapezoidal

**Figure D**



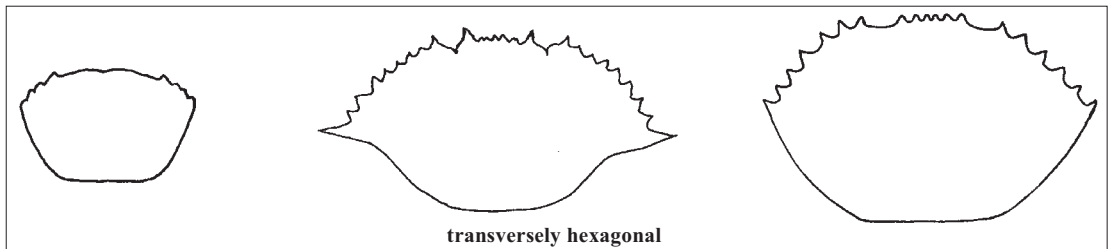
pentagonal

Figure E



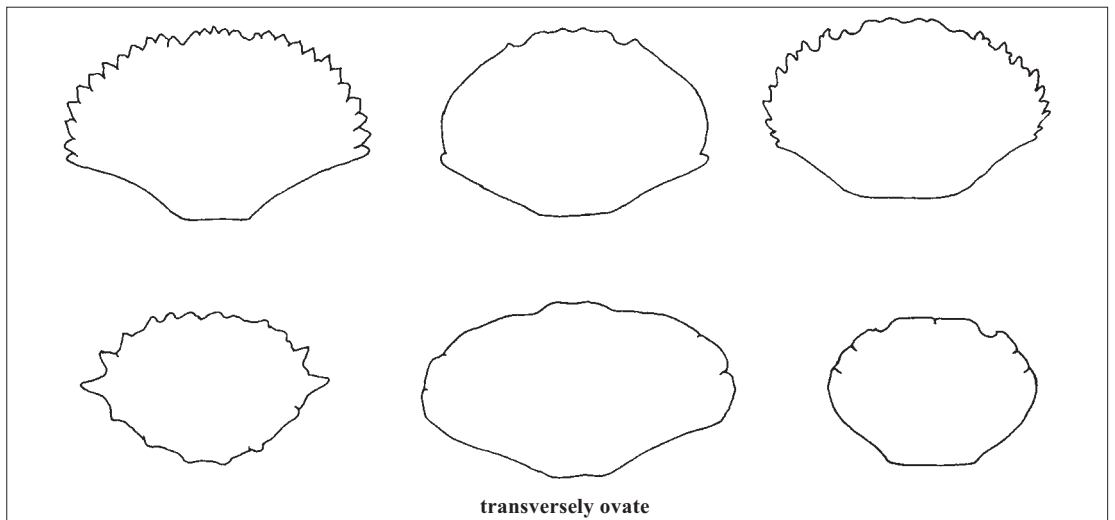
hexagonal

Figure F



transversely hexagonal

Figure G



transversely ovate

Figure H



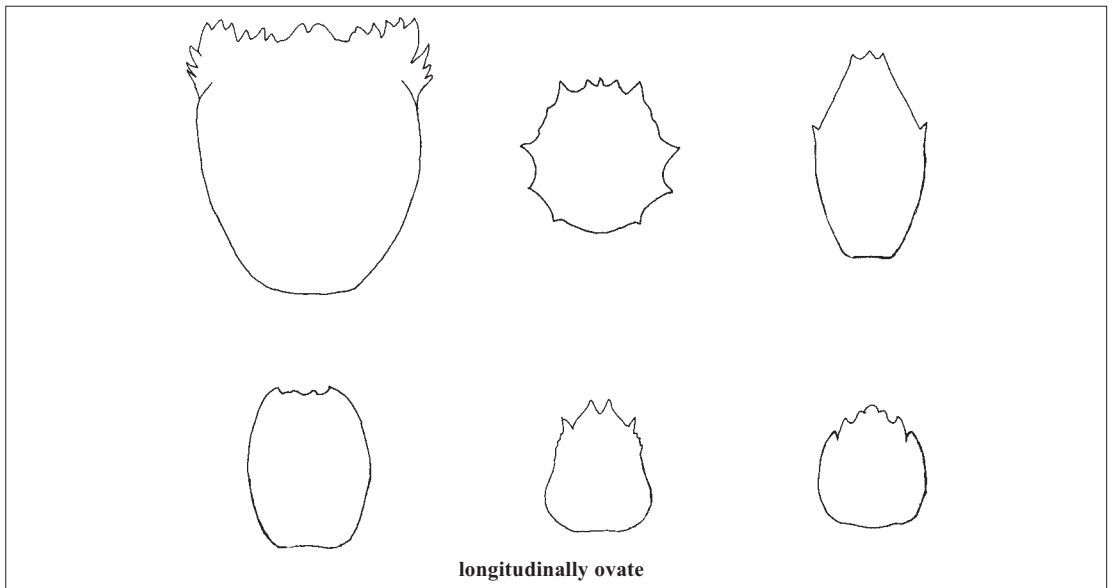


Figure I

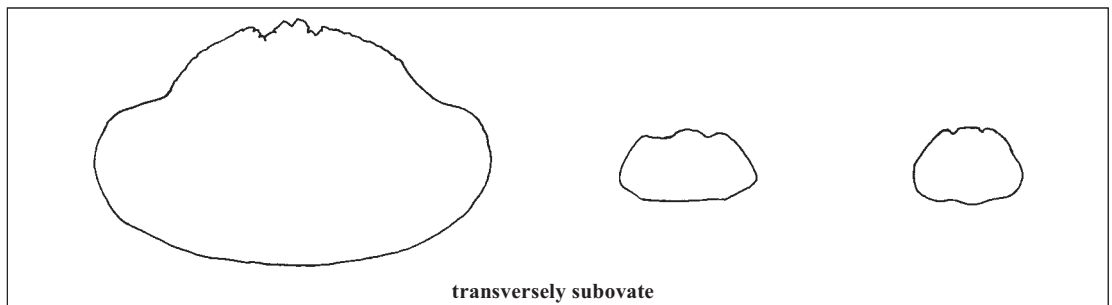


Figure J

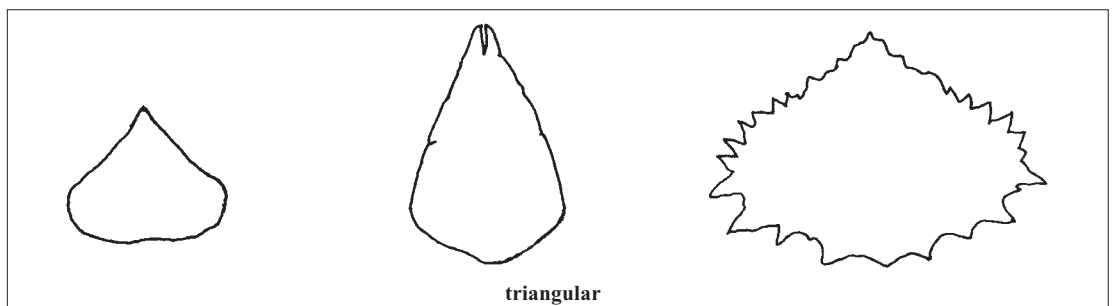
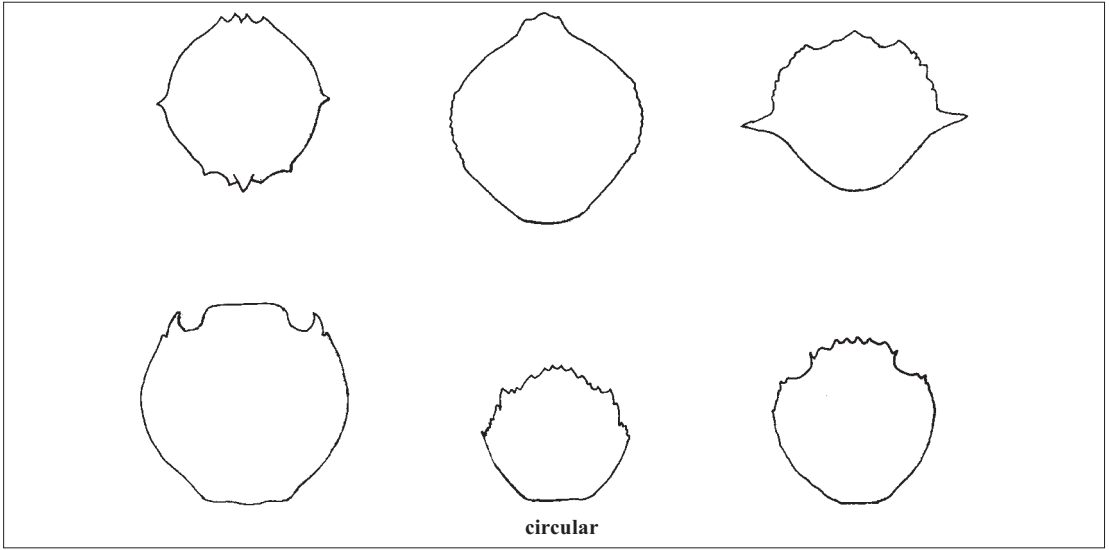
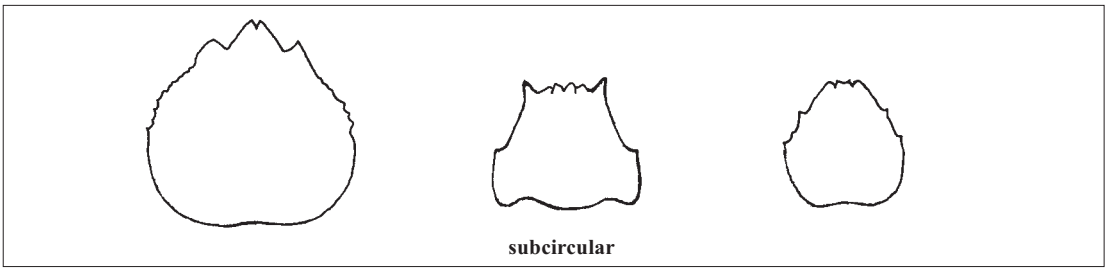


Figure K



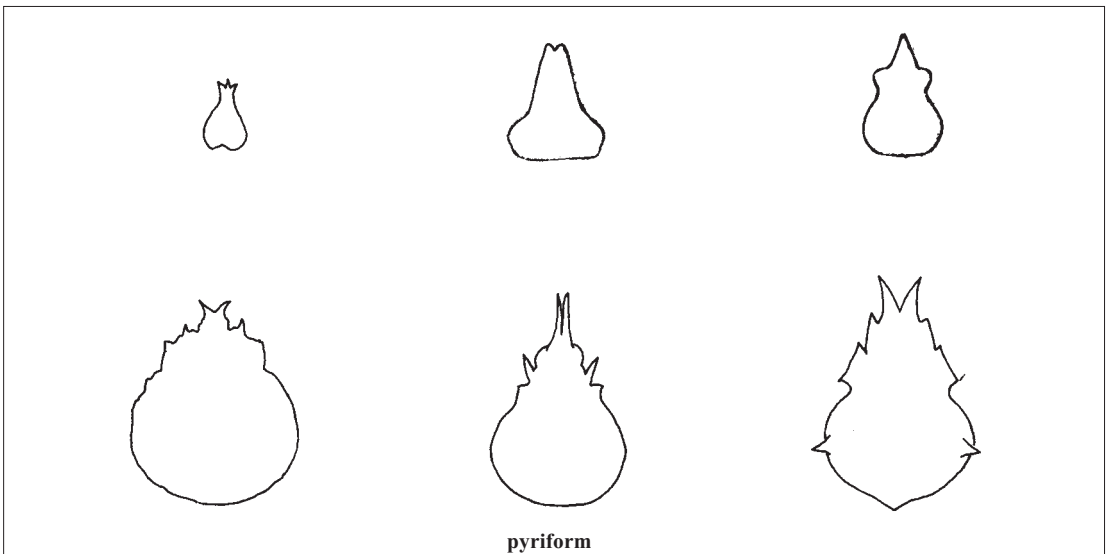
circular

Figure L



subcircular

Figure M



pyriform

Figure N

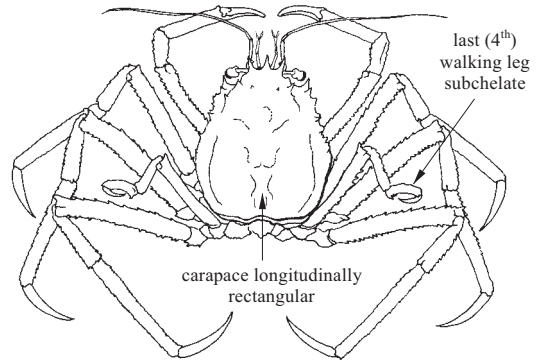
**GUIDE TO FAMILIES OF INTEREST TO FISHERIES OCCURRING IN THE AREA**

**HOMOLIDAE**

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**Homolid crabs, paromolas**

Carapace longitudinally rectangular, with spines and hairs. Front narrow, usually with 3 long horn-like projections. Eyes on long articulated stalks. Male chelipeds long. Last (fourth) pair of legs slender, reduced, inserted obliquely on carapace and directed upwards; dactylus and propodus together forming a distinct subchela. Male abdominal segments distinct, movable.

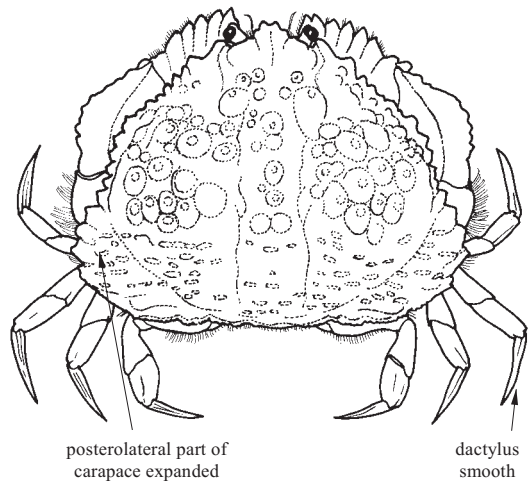


**CALAPPIDAE**

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**Box crabs**

Carapace strongly convex, transversely subovate anterior and lateral margins forming a single arc; frontal margin triangular, narrow; posterolateral parts forming clypeiform expansions over the legs, ending in broader or narrower teeth. Merus of third maxillipeds distinctly triangular; opening for afferent respiratory current at base of chela, no canal present along sides of buccal cavern even when third maxillipeds pushed aside. Chelipeds large and flattened, in a flexed position fitting exactly against the front of the body, eyes just looking over them; palm of chelae with high dorsal cock's comb-like crest; right (larger) chela with special tooth on base of pollex for peeling gastropods; last 4 pairs of legs similar, smooth; dactyls without spines or hairs, not paddle-like. Male abdominal segments 3 to 5 completely fused.

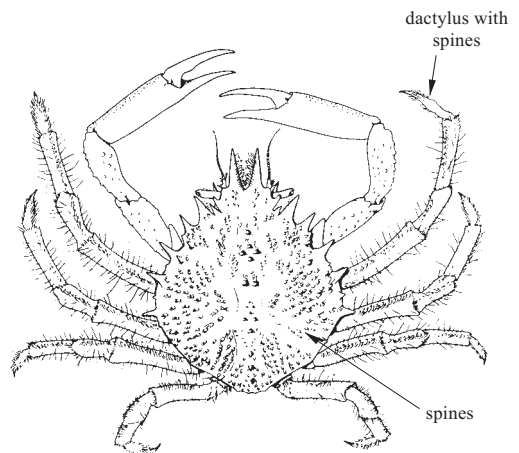


**MAJIDAE**

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**Spider crabs**

Carapace narrowed anteriorly, usually triangular or pyriform in shape, often with spines; front produced between the eyes, usually ending in 2 long teeth, which are separated or close together; anterolateral margin often with spines or teeth; last 4 pairs of pereopods similar (except in length), usually hairy and spiny, dactylus with spines.

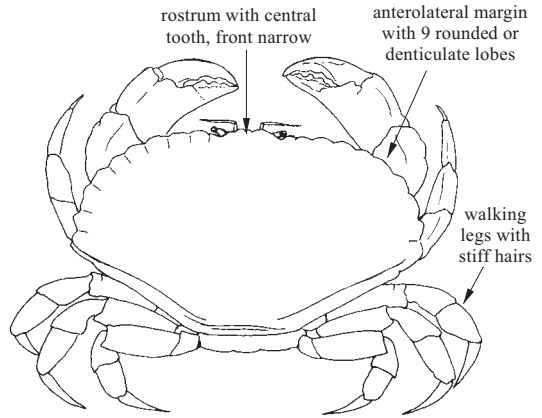


**CANCRIDAE**

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**Rock crabs**

Carapace transversely oval or hexagonal; front not produced in form of a rostrum but having a central tooth, narrow compared to maximum carapace width; anterolateral margins toothed (9 low, blunt, rounded or denticulate lobes in species listed here); posterolateral part of carapace not forming a clypeiform expansion over the bases of the legs; margins of carapace not densely setose. Antennal flagellum non setose. Last four pairs of legs similar, with stiff hairs.

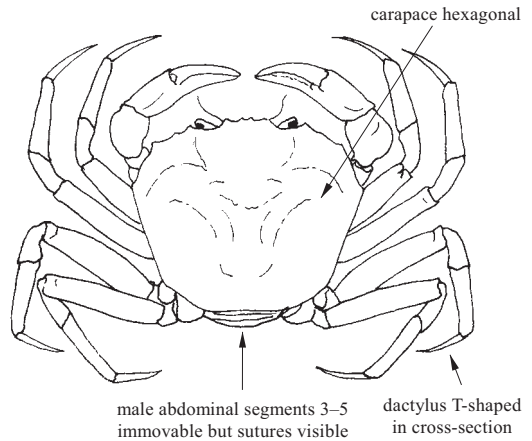


**GERYONIDAE**

Page 300

**Deep-sea crabs, geryons**

Carapace flat, smooth or granular, hexagonal, about as long as wide; front broad, not produced, but with four teeth; anterolateral margin with 3 or 5 indistinct shallow teeth. Last 4 pairs of legs long, slender, similar, smooth; dactylus T-shaped in cross-section. Male abdominal segments 3 to 5 fused, functionally immovable, but sutures still visible.

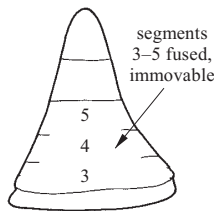
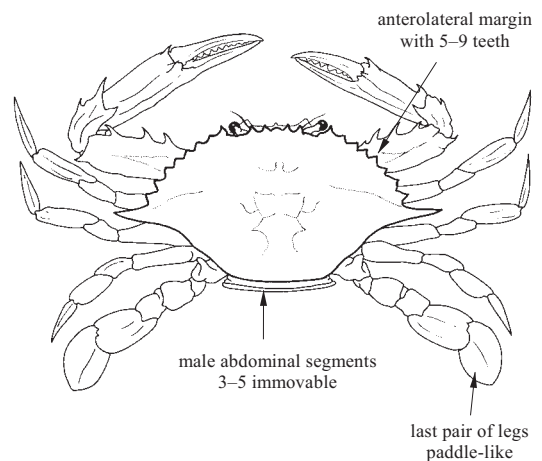


**PORTUNIDAE**

Page 307

**Swimming crabs**

Carapace hexagonal, transversely ovate to transversely hexagonal, sometimes almost circular; dorsal surface generally relatively flat, often ridged or granulose; front broad, margin usually multidentate; 5 to 9 teeth on each anterolateral margin; posterolateral margins usually distinctly converging. Last pair of legs with distal 2 segments wider and more flattened than these segments of previous legs, in most species the dactylus is oval and paddle-shaped, adapted for swimming purposes, none of the dactyli with conspicuous spines. Male abdominal segments 3 to 5 completely fused, immovable.



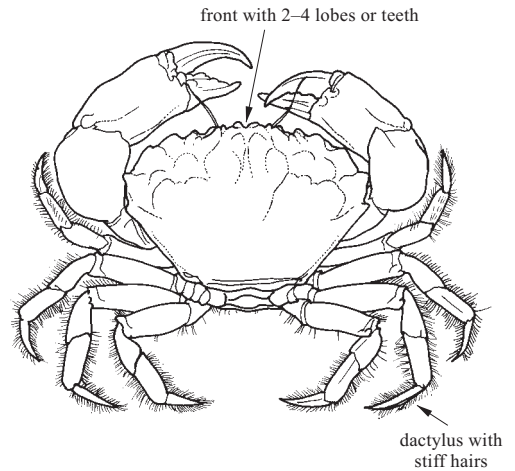
male abdomen

**MENIPPIDAE**

Page 328

**Stone crabs**

Carapace transversely ovate to squarish. Eyes normal, orbits never reaching edge of carapace. Antennae positioned adjacent to antennules, flagellum always free. Frontal margin with 2 to 4 lobes or teeth. Anterolateral margin with distinct lobes, teeth or spines. Major chela with basal crushing molariform tooth; fingers of minor chela not forceps-like. Dactyli of walking legs with stiff hairs. Male abdomen with 7 movable segments. Second gonopod in males longer than first; distal part of second gonopod developed into filiform flagellum.

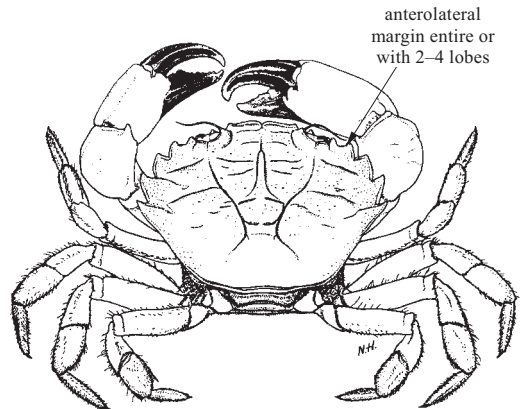


**PANOPEIDAE**

Page 333

**Panopeid mud crabs**

Carapace usually hexagonal, transversely hexagonal or transversely ovate. Eyes normal, orbits never reaching edge of carapace. Antennae positioned adjacent to antennules, flagellum always free. Frontal margin usually bilobed. Anterolateral margins entire, or with 2 to 4 teeth or lobes. Chelipeds with fingers pointed or spoon-like, subequal or markedly unequal, similar or dissimilar in form. Male abdomen elongate and narrow, with segments 3 to 5 fused, covering most of sternite 4. First gonopod apex with complex lobes or folds; often with spines and long setae. Second gonopod shorter than first gonopod.

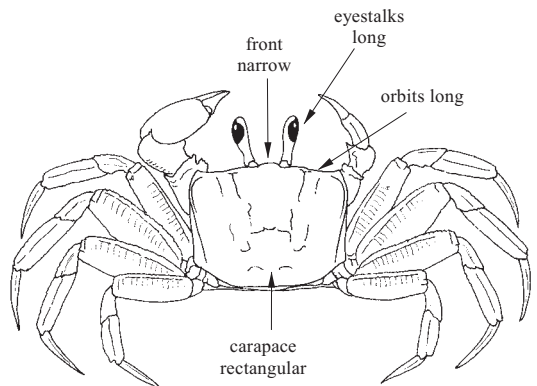


**OCYPODIDAE**

Page 337

**Ghost crabs, fiddler crabs**

Carapace usually rectangular or nearly so; front relatively narrow and somewhat bent downward, without teeth; orbits occupying whole anterior border outside front, outer walls of orbits often open, eyestalks long (longer than width of front); third maxillipeds usually completely covering mouth cavity; last 4 pairs of walking legs similar (apart from differences in length and pubescence), with hairs and granules; dactyls smooth or ridged but not conspicuously spiny.

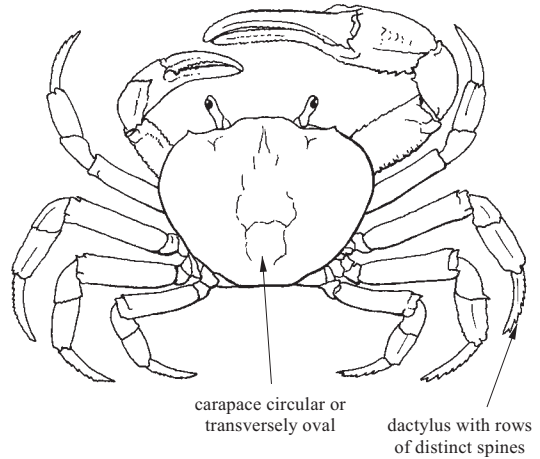


**GECARCINIDAE**

Page 342

**Land crabs**

Carapace circular or transversely oval, not strongly depressed, dorsal surface smooth, strongly convex longitudinally and transversely, anterolateral margins strongly arched, not divided into teeth or lobes; front wider than length of eyes, without teeth. Rhomboidal gap present between third maxillipeds. Posterior 4 pairs of legs similar, stout, their dactyls longitudinally ridged, ridges with rows of distinct spines. All male abdominal segments distinct, movable.

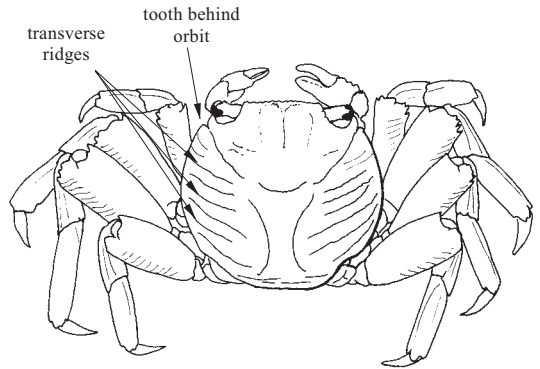


**GRAPSIDAE**

Page 345

**Lightfoot crabs, marsh crabs, matchbox crabs**

Carapace squarish or circular, dorsally often with transverse ridges. Front broader than eyes, usually without teeth, if teeth or lobes are present these are even in number. Ventral margin of orbit runs downwards toward buccal cavity. Anterolateral margin of carapace with at most 2 teeth behind orbit. Pterygostomian region may be setose but no network-like pattern discernible. Rhomboidal gap between third maxillipeds with mandibles exposed, merus and ischium of third maxillipeds without hairy oblique ridge; posterior 4 pairs of legs similar, their dactyli with conspicuous spines. Male abdomen occupying all space between bases of fifth legs.

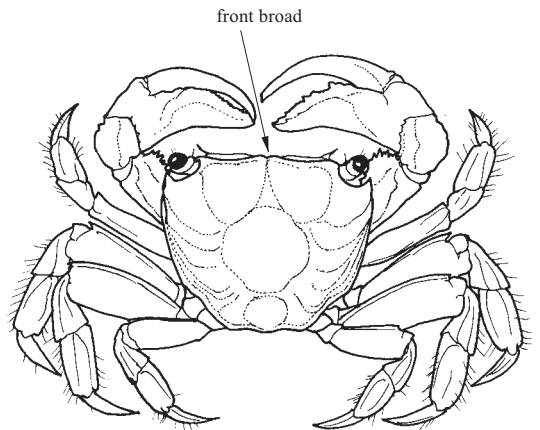


**SESARMIDAE**

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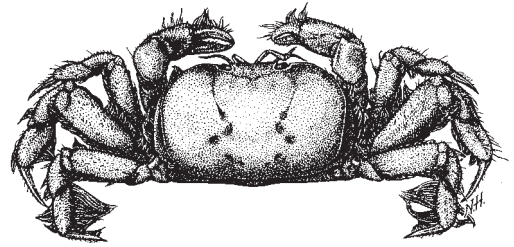
**Sesarmid mangrove crabs**

Carapace usually squarish, often with oblique or transverse ridges. Front broader than eyes, usually without teeth, if teeth or lobes are present these are even in number. Ventral margin of orbit runs downwards toward buccal cavity. Anterolateral margin of carapace with at most 2 teeth behind orbit. Pterygostomian region with network-like pattern of very short stiff setae. Rhomboidal gap between third maxillipeds with mandibles exposed, merus and ischium of third maxillipeds with oblique ridge; posterior 4 pairs of legs similar, their dactyli with conspicuous spines. Male abdomen occupying all space between bases of fifth legs.

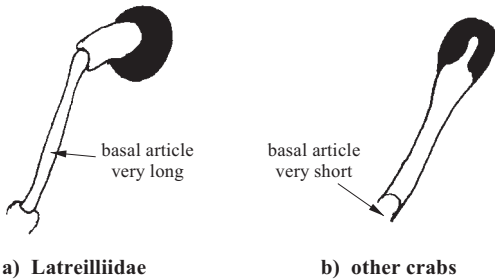


**KEY TO THE FAMILIES OF BRACHYURAN CRABS OCCURRING IN THE AREA**

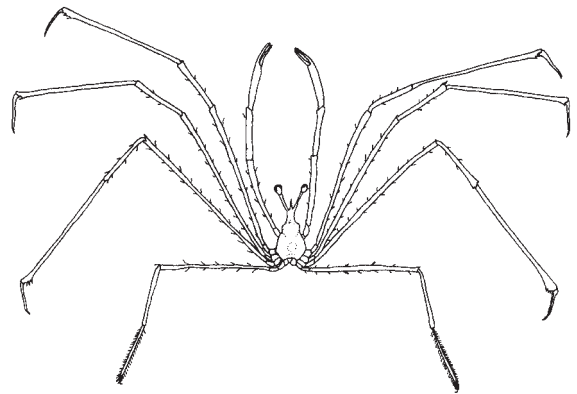
- 1a. Only 3 pairs of walking legs visible, fourth pair absent (Fig. 1) . . . . **Hexapodidae**
- 1b. Four pairs of walking legs visible . . . . . → 2
- 2a. Basal segment of eyestalk much longer than terminal article, from dorsal view, eyestalk appear to be 2-segmented (Figs 2a and 3) . . . **Latreilliidae**
- 2b. Basal segment of eyestalk much shorter than terminal article, from dorsal view, eyestalk appears to be unsegmented (Fig. 2b) . . . . . → 3



**Fig. 1 Hexapodidae**

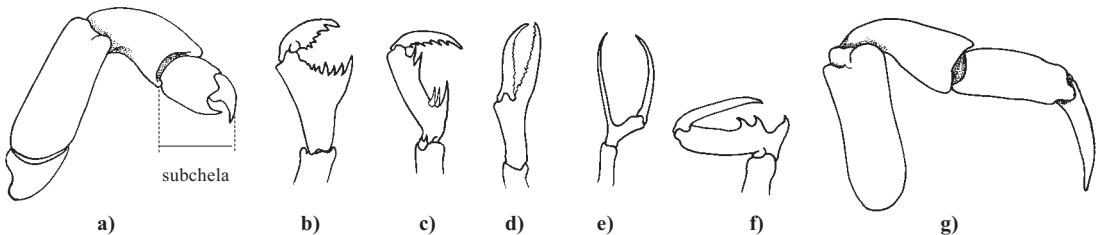


**Fig. 2 eyestalk**



**Fig. 3 Latreilliidae**

- 3a. Fourth (last) pair of walking legs distinctly subchelate to chelate (Fig. 4a–f) or strongly reduced to just 3 articles, inserted obliquely on carapace and directed upwards . . . . . → 4
- 3b. Fourth (last) pair of walking legs normal in structure or reduced in size but not subchelate or chelate (Fig. 4g) and never reduced to just 3 articles, inserted laterally on carapace and directed laterally. . . . . → 9



**Fig. 4 last leg: (a–f) various types of subchelate to chelate conditions of propodus and dactylus; (g) normal leg**

- 4a. Merus of third maxilliped distinctly triangular in shape (Fig. 5a) . . . → 5
- 4b. Merus of third maxilliped quadrate to subquadrate, never clearly triangular in shape (Fig. 5b, c) . . . . . → 6

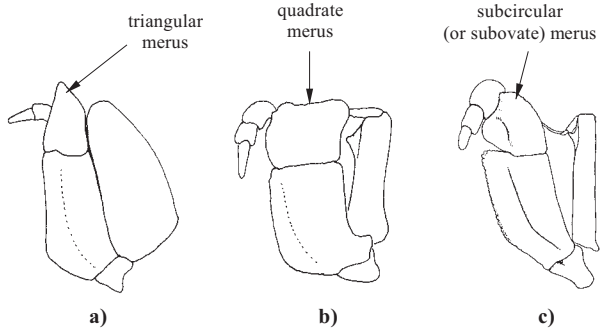


Fig. 5 third maxilliped

- 5a. Eyes unpigmented, eyestalks with many small spines; front triangular (Fig. 6); crab usually carries pieces of inanimate objects (e.g. dead shells and sticks) when alive . . **Cymonomidae**
- 5b. Eyes pigmented, eyestalks without spines; front with median incision (Fig. 7); crab carries inanimate objects (e.g. shells and leaves) or sea anemones . . . . . **Dorippidae**

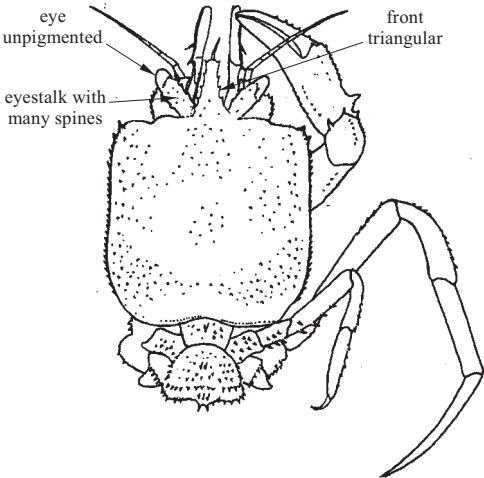


Fig. 6 Cymonomidae

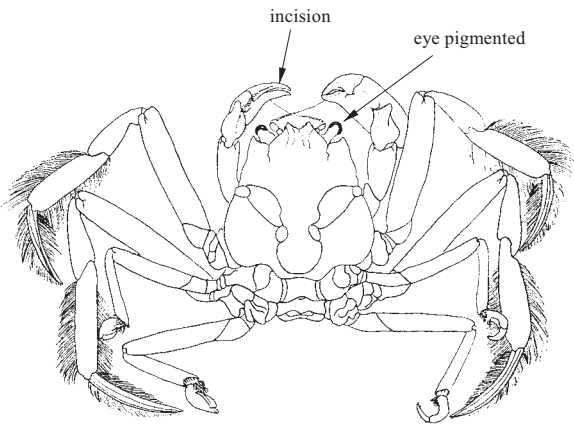


Fig. 7 Dorippidae

- 6a. Carapace pyriform (pear-shaped) (Figs 9 and 10); orbits incomplete; carapace, chelipeds and legs often with hooked setae; vulvae of adult female on thoracic sternum (Fig. 8a) . . . . . **Majoidea (Epialtidae, Inachidae (in part))**
- 6b. Carapace shape not as above; orbits usually complete; carapace, chelipeds and legs without hooked setae; vulvae of adult female on coxae of third legs (Fig. 8b). . . . . → 7

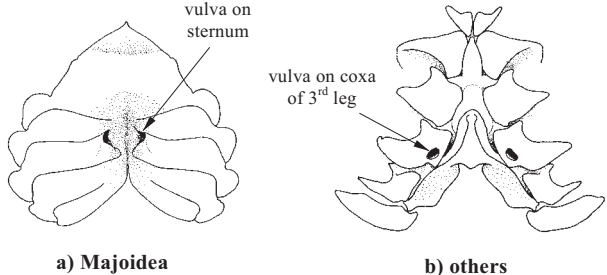


Fig. 8 position of female vulvae on ventral side of body (abdomen omitted)



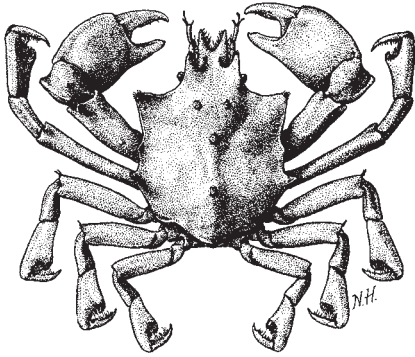


Fig. 9 Epialtidae

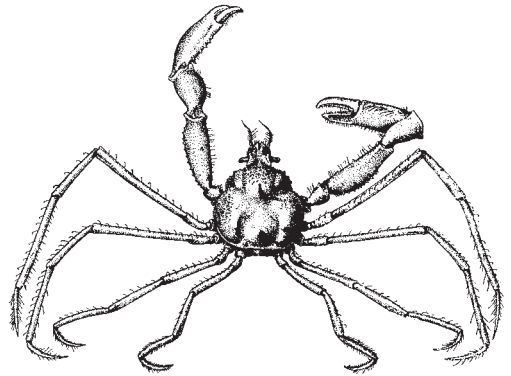


Fig. 10 Inachidae

7a. Carapace longitudinally rectangular, dorsal surface glabrous or with scattered stiff setae; only fourth pair of walking legs with dactylus and propodus subchelate to chelate (Fig. 11) . . . . . **Homolidae**

7b. Carapace longitudinally ovate, circular or hexagonal, dorsal surface usually with dense, soft setae; both third and fourth walking legs with dactylus and propodus subchelate to chelate; carries sponges and sea anemones when alive . . . . . → 8

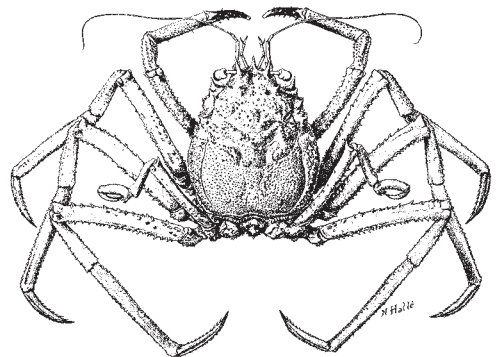


Fig. 11 Homolidae

8a. Carapace circular to hexagonal; a small platelet-like structure usually intercalated between edges of sixth abdominal segment and telson (Fig. 12a); crab carries sponges, tunicates, or bivalve shells (Fig. 13). . . . . **Dromiidae**

8b. Carapace longitudinally ovate; no platelet-like structure intercalated between edges of sixth abdominal segment and telson (Fig. 12b); crab believed to carry sponges or related objects (Fig. 14) . . . . . **Homolodromiidae**

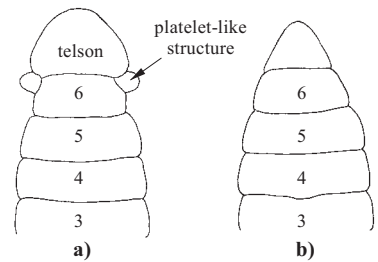


Fig. 12 male abdomen

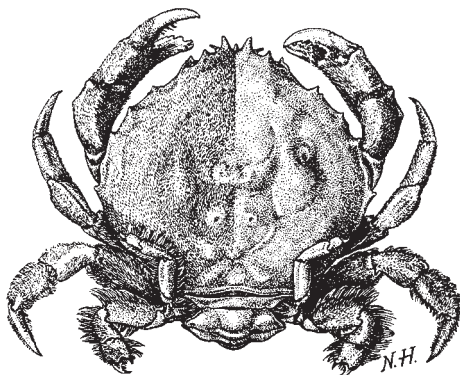


Fig. 13 Dromiidae

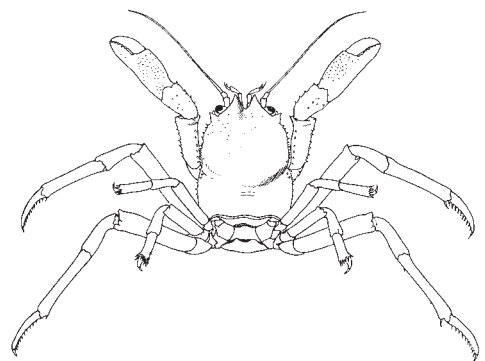


Fig. 14 Homolodromiidae

- 9a. Merus of third maxilliped distinctly triangular in shape (Fig. 15a) . . . . . → 10
- 9b. Merus of third maxilliped quadrate to ovoid, never distinctly triangular in shape (Fig. 15b). . . → 13

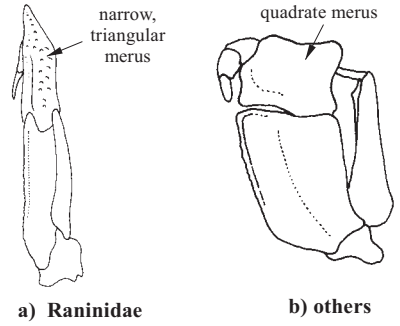


Fig. 15 third maxilliped

- 10a. Carapace longitudinally ovate; sternum very narrow, thoracic sternites 5 to 7 very narrow (Fig. 16a); fingers of chela strongly bent (Fig. 17) . . . . . **Raninidae**
- 10b. Carapace shape not as above; sternum normal, thoracic sternites 5 to 7 not strongly narrowed (Fig. 16b); fingers of chela not strongly bent . . . . . → 11

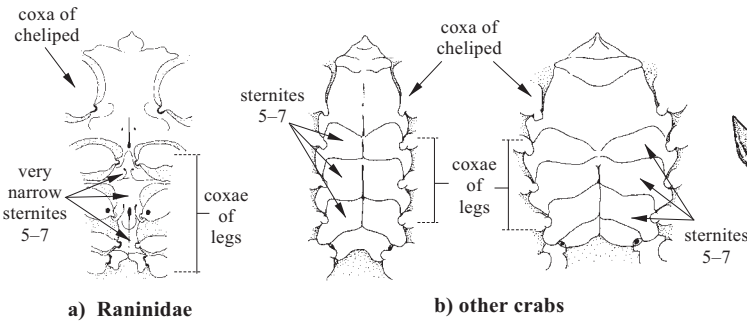


Fig. 16 thoracic sternum (ventral side of body between legs)

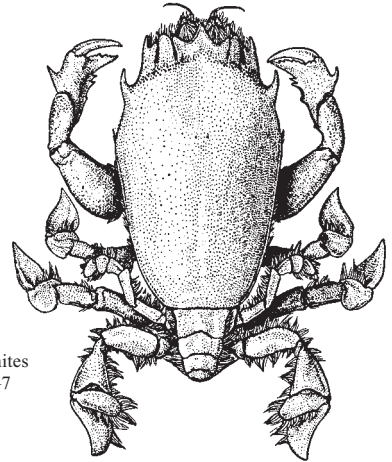


Fig. 17 Raninidae

- 11a. Opening for afferent respiratory current below orbits, adjacent to endostome, with distinct canal present along sides of buccal cavern (Fig. 18a) when third maxillipeds pushed aside; sides of carapace never expanded to form a clypeiform process (= expanded posterior edge) (Fig. 19) . . . . . **Leucosiidae**
- 11b. Opening for afferent respiratory current at base of chela, no canal present along sides of buccal cavern even when third maxillipeds pushed aside (Fig. 18b) . . . . . → 12

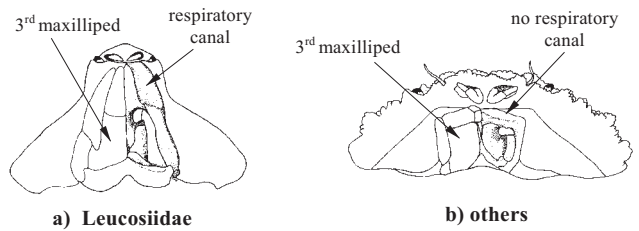


Fig. 18 presence or absence of respiratory canal

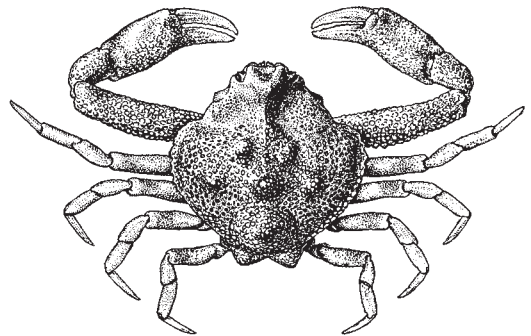


Fig. 19 Leucosiidae

- 12a. Sides of carapace expanded to form a clypeiform process; larger chela with a specialized cutting tooth; propodus and dactylus of legs not paddle-like (Fig. 20) . . . **Calappidae**
- 12b. Sides of carapace not expanded to form a clypeiform process; chela without specialized cutting tooth; propodus and dactylus of legs paddle-like (Fig. 21) . . . . . **Matutidae**

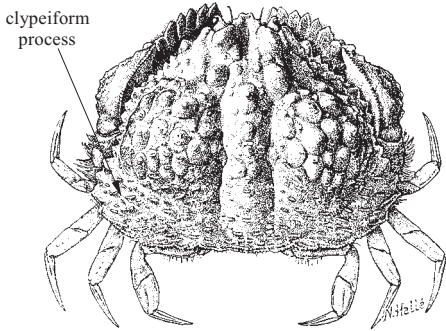


Fig. 20 Calappidae

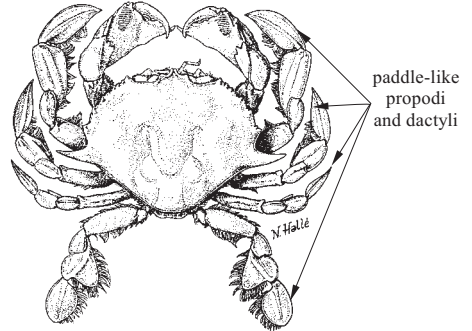


Fig. 21 Matutidae

- 13a. A small platelet-like structure always intercalated present between edges of sixth abdominal segment and telson (Fig. 12a); fourth leg strongly reduced, present only as a short appendage, partially subchelate; no known carrying behaviour (Fig. 22) . . . . . **Dynomenidae**
- 13b. No platelet-like structure intercalated between edges of sixth abdominal segment and telson (Fig. 12b); fourth leg reduced but always distinct, with most segments slender, relatively long . . . . . → 14
- 14a. Fourth walking leg strongly reduced compared to other leg (Fig. 23) . . . . . **Palicidae**
- 14b. Fourth walking leg subequal to other legs, or if smaller, not greatly reduced in size compared to third walking leg . . . . . → 15

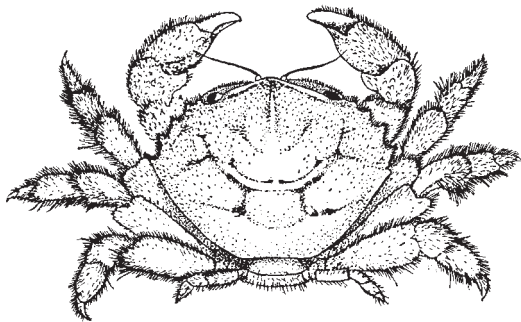


Fig. 22 Dynomenidae

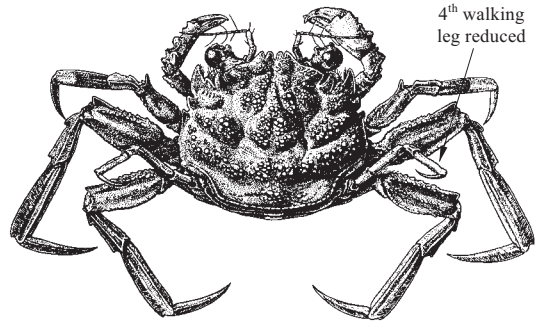


Fig. 23 Palicidae

- 15a. Fossae (sockets) for antennulae squarish to longer than broad, antennulae fold longitudinally or almost so (Fig. 24a, b) . . . . . → 16
- 15b. Fossae for antennulae broader than long, antennulae fold transversely or obliquely (Fig. 24c, d) . . . . . → 22

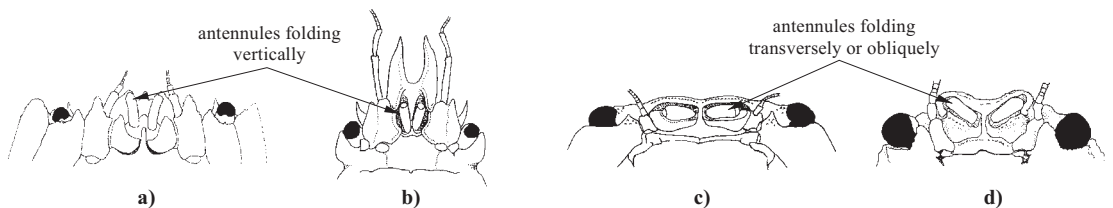


Fig. 24 anteriormost part of body (ventral view)

- 16a. Carapace pyriform, subpyriform, triangular, circular, or subcircular; orbits incomplete to absent (Fig. 25a) . . . . . → 17
- 16b. Carapace longitudinally and transversely ovate, hexagonal, circular, or subcircular; orbits complete (Fig. 25b) . . . . . → 18

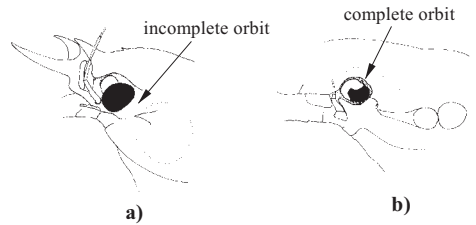


Fig. 25 orbits

- 17a. Carapace well calcified, dorsal surface gently to strongly convex, almost always covered with spines or granules (Fig. 26); hooked setae often present; abdomen usually with 6 segments and a telson (Fig. 27a) (rarely 5 segments and a telson); male genital openings coxal (i.e. situated at basis of coxae of fourth legs (Fig. 28a)) . . . . . **Majoidae (Majidae, Pisidae, Inachidae (in part))**
- 17b. Carapace poorly calcified, soft, dorsal surface flat to almost flat, never covered with spines or spinules (Fig. 29); hooked setae absent; abdomen always with only 5 segments and a telson (Fig. 27b) (or fewer segments, some completely fused); male genital openings sternal (Fig. 28b). . . . . **Hymenosomatidae**

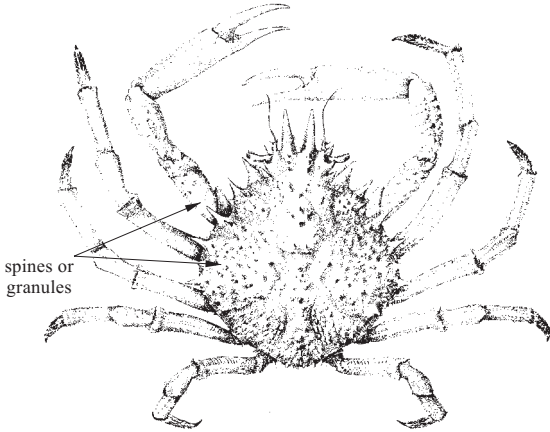


Fig. 26 Majidae

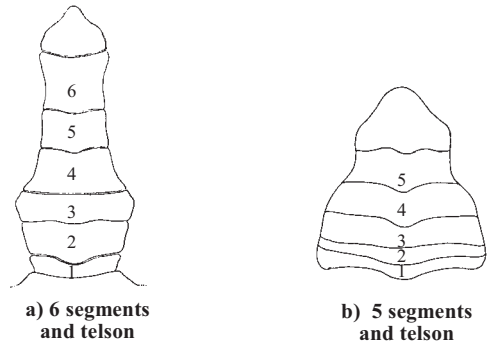


Fig. 27 abdomen

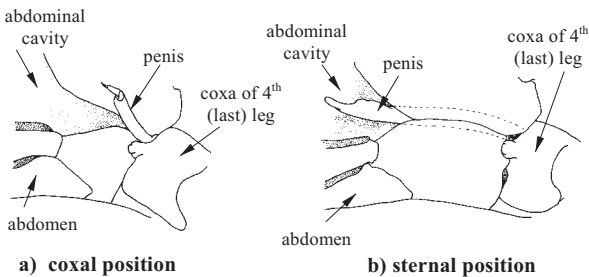


Fig. 28 position of male genital opening

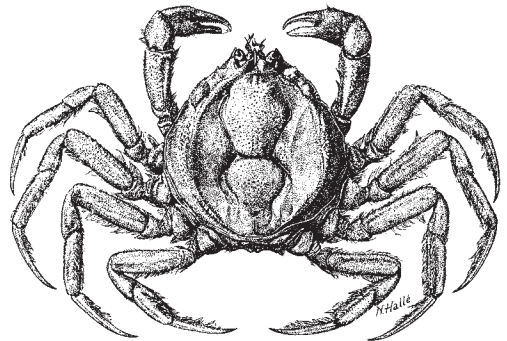


Fig. 29 Hymenosomatidae

- 18a. Antennal flagellum distinctly setose (Fig. 30a) . . . . . → **19**
- 18b. Antennal flagellum slightly setose to glabrous (Fig. 30b) . . . . . → **21**

- 19a. Front entire, without teeth or lobes; anterolateral and posterolateral margins of carapace lined with dense, long setae forming distinct fringe (Fig. 31). . . . . **Thiidae**
- 19b. Front with teeth or lobes; anterolateral and posterolateral margins of carapace with relatively dense setae, but not forming distinct fringe . . . . . → **20**

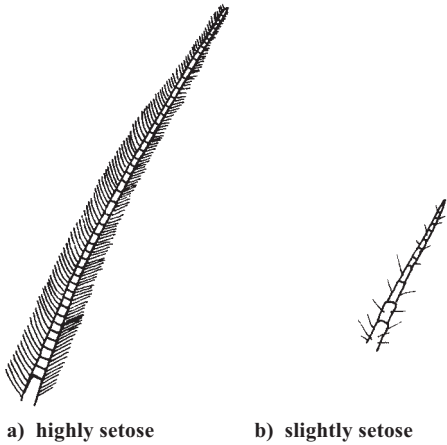


Fig. 30 antennal flagellum

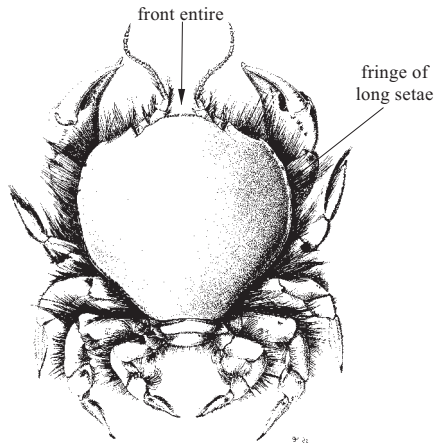


Fig. 31 Thiidae

- 20a. Antennae very long, longer than or as long as carapace length, strongly setose (Fig. 32) . . . . . **Corystidae**
- 20b. Antennae short, much shorter than carapace length, not strongly setose (Fig. 33) . . . **Atelecyclidae**

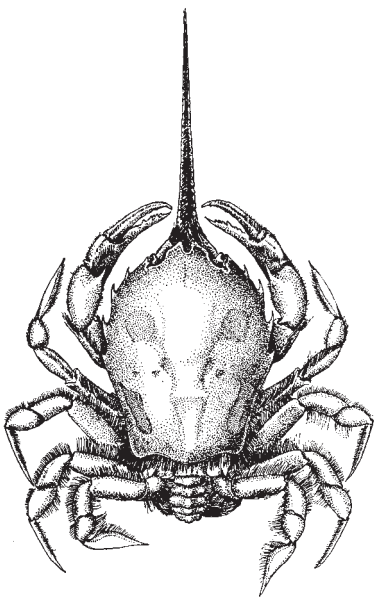


Fig. 32 Corystidae

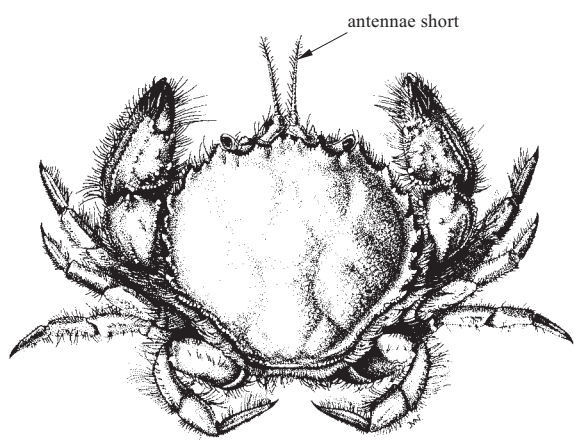


Fig. 33 Atelecyclidae

**21a.** Carapace hexagonal, its width and length subequal; front broad compared to maximum carapace width; anterolateral margins of carapace weakly convex, each with 4 or 5 well-developed teeth (Fig. 34) . . . . . **Pirimelidae**

**21b.** Carapace transversely ovate; front narrow compared to maximum carapace width; anterolateral margins of carapace strongly convex, each usually with well-defined teeth or lobes (Fig. 35) . . . . . **Cancridae**

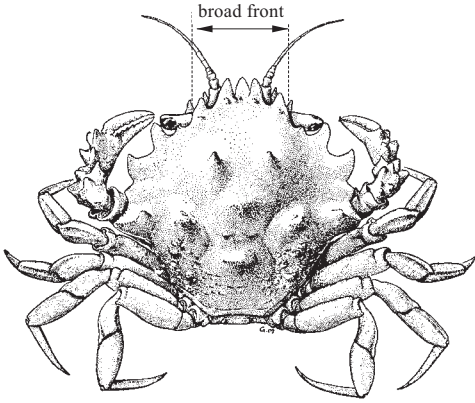


Fig. 34 Pirimelidae

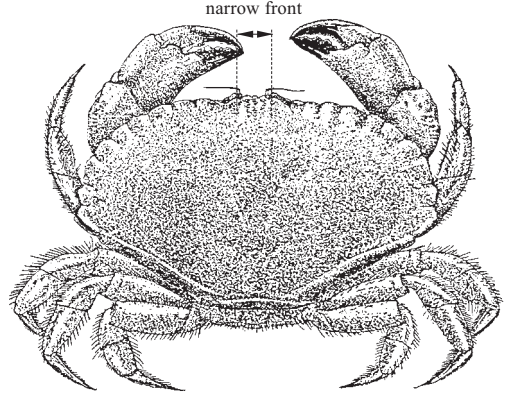


Fig. 35 Cancridae

**22a.** Carapace triangular or hexagonal; front triangular, forked or spiniform; chelipeds usually stout, very elongate (Fig. 36) . . . . . **Parthenopidae**

**22b.** Carapace shape not as above; front usually truncate or multidentate; chelipeds usually stout to slender, relatively short; if chelipeds long, usually slender . . . . . → **23**

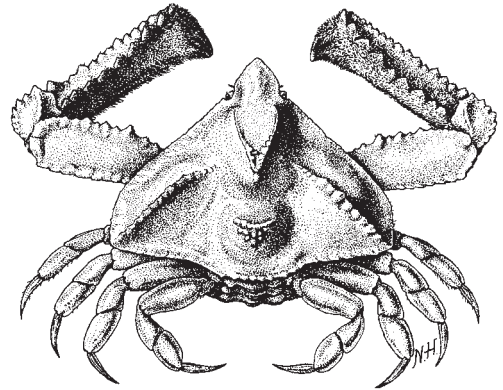


Fig. 36 Parthenopidae

**23a.** Merus of third maxilliped strongly reduced compared to ischium and other segments (Fig. 37a), sometimes completely fused with ischium (Fig. 37b); male genital openings always sternal (Fig. 38a); males always much smaller than females; parasites on hard corals or symbionts on molluscs or worms . . . . . → **24**

**23b.** Merus of third maxilliped well developed, usually quadrate in shape (Fig. 37c); male genital openings usually coxal (i.e. situated at basis of coxae of fourth legs, Fig. 38b), occasionally sternal; males not much smaller, subequal or larger in size to females; free-living crabs, not parasites of hard corals, not symbionts on molluscs or worms . . . . . → **25**

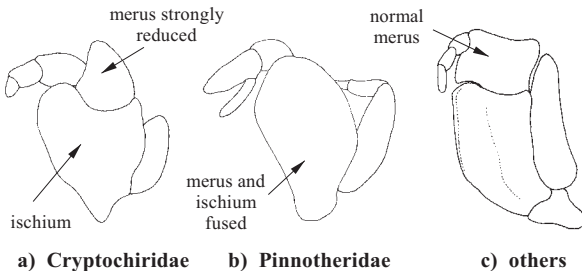


Fig. 37 third maxilliped

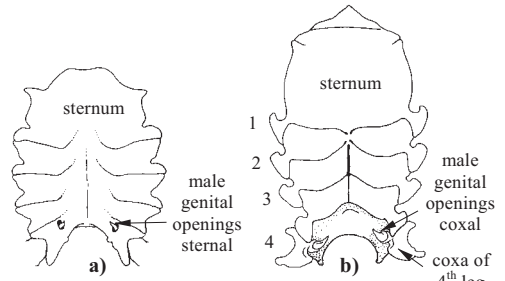


Fig. 38 position of male genital opening

24a. Carapace circular to transversely ovate; dorsal surface of carapace smooth; merus of third maxilliped may be fused with ischium; dactylus usually subterminally to basally attached to propodus with palp often appearing bifurcated; dactylus of legs not strongly hooked; parasitic or commensal on molluscs or worms (Fig. 39) . . . . . **Pinnotheridae**

24b. Carapace longitudinally ovate to longitudinally rectangular; dorsal surface of carapace usually with small spines or tubercles; merus of third maxilliped always separated from ischium, dactylus terminally attached to propodus; dactylus of legs strongly hooked; symbionts on hard corals (Fig. 40). . . . . **Cryptochiridae**

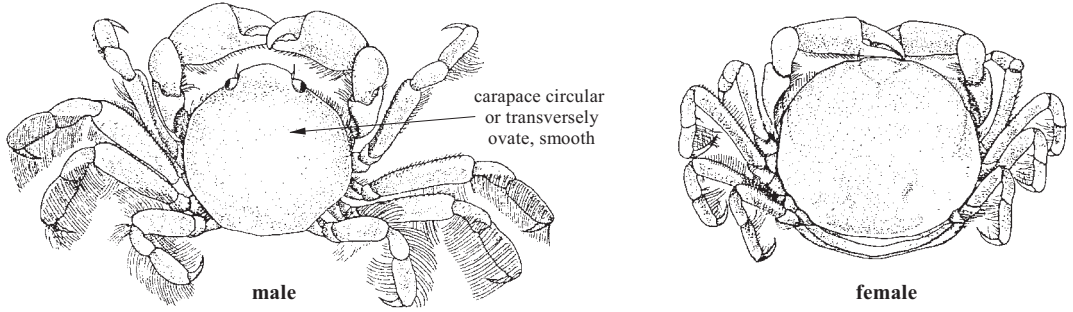


Fig. 39 Pinnotheridae  
(after Christiansen, 1969)

25a. Last pair of legs with dactylus flattened, paddle-like or at least noticeably wider than that of the third pair of walking legs (*Carcinus* and *Xaiva*) (Figs 41 and 42a) . . . **Portunidae**

25b. Last pair of legs with normal dactylus (Fig. 42b) . . . . . → 26

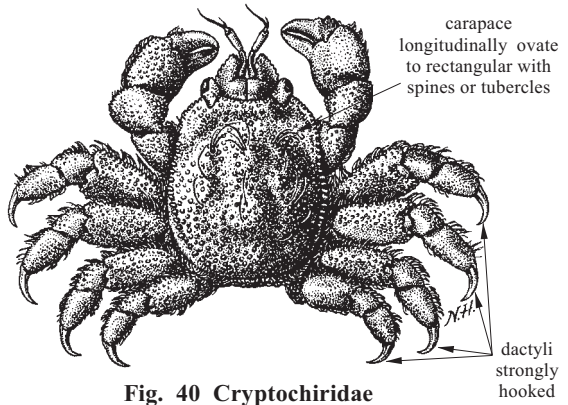


Fig. 40 Cryptochiridae

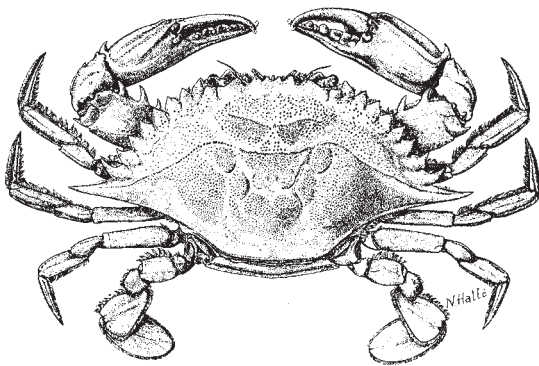


Fig. 41 Portunidae

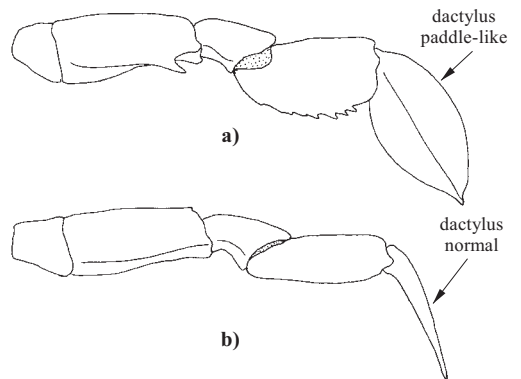
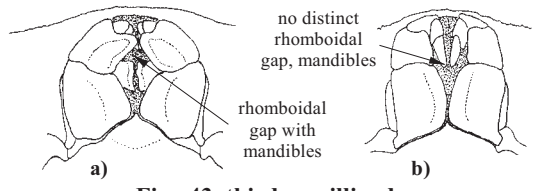


Fig. 42 fourth leg

**26a.** Distinct rhomboidal gap between third maxillipeds; mandibles usually visible when mouthparts closed (Fig. 43a) . . . . . → **27**

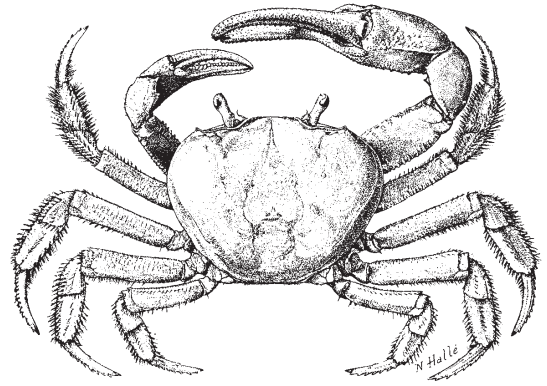
**26b.** No distinct rhomboidal gap between third maxillipeds (Fig. 43b); mandibles never visible when mouthparts closed . . . . . → **29**



**Fig. 43** third maxillipeds

**27a.** Carapace transversely ovate to circular, dorsal surface usually very smooth, rounded; land crabs (Fig. 44) . . . . . **Gecarcinidae**

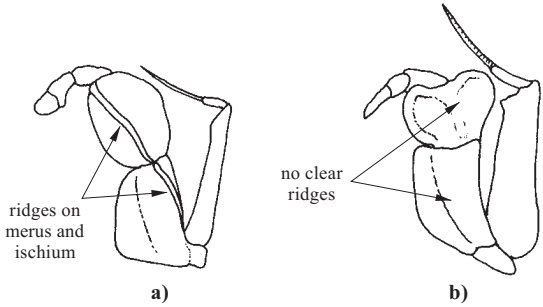
**27b.** Carapace squarish, transversely rectangular, trapezoidal or circular, dorsal surface rough, rugose or setose . . . . . → **28**



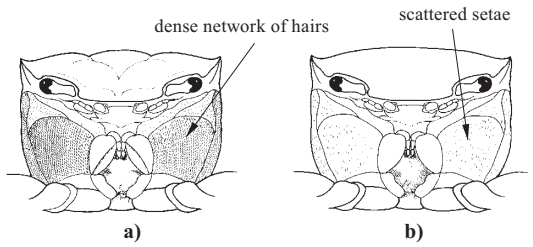
**Fig. 44** Gecarcinidae

**28a.** Merus and ischium of third maxillipeds with a ridge (Fig. 45a); pterygostomial region with a network-like (reticulated) pattern of very short, stiff setae (Figs 46a and 47) . . . . . **Sesarmidae**

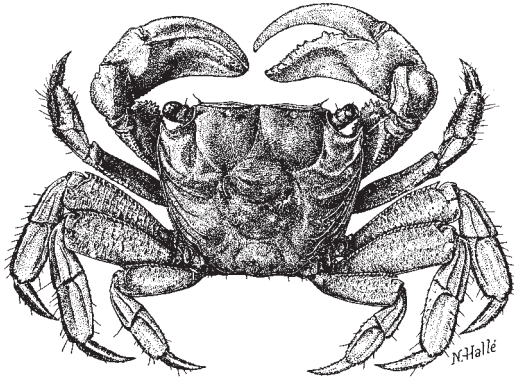
**28b.** Merus and ischium of third maxillipeds without a ridge (Fig. 45b); pterygostomial region without a network-like (reticulated) pattern of very short, stiff setae (Figs 46b and 48) . . . . . **Grapsidae**



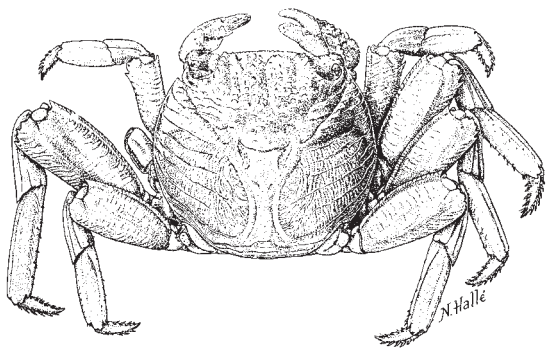
**Fig. 45** third maxilliped



**Fig. 46** pterygostomial region



**Fig. 47** Sesarmidae



**Fig. 48** Grapsidae



- 29a. Front simple, triangular, very narrow compared to broader carapace (Figs 49a and 50)  
 ..... **Ocypodidae**
- 29b. Front truncate, multilobate or multidentate, relatively broad compared to transverse carapace (Fig. 49b) ..... → 30

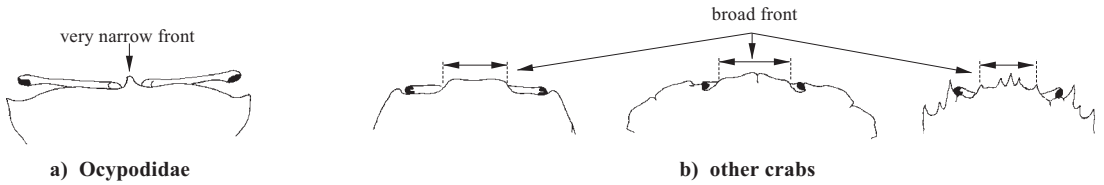


Fig. 49 anterior part of carapace (dorsal view)

- 30a. Cross-section of dactylus of walking leg T-shaped (Figs 51a and 52) . . . **Geryonidae**
- 30b. Cross-section of dactylus of walking leg not T-shaped, usually quadrate to ovate (Fig. 51b) . . . . . → 31

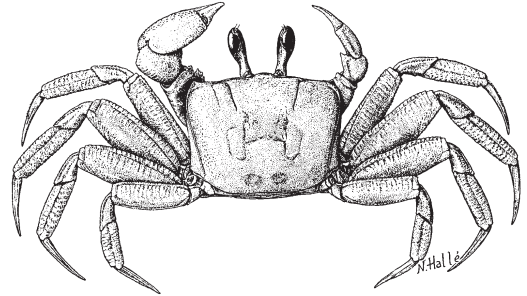


Fig. 50 Ocypodidae

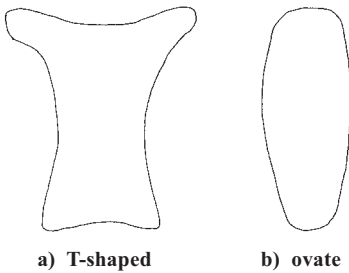


Fig. 51 cross-section of dactylus of walking leg

- 31a. Male abdominal segments 2 and 3 always immovable, completely to incompletely fused (Fig. 53a); male first gonopods strongly bent (Fig. 54a); small semiterrestrial crabs usually associated with estuarines habitats and mangroves (Fig. 55) . . . . . **Camptandriidae**
- 31b. Male abdominal segments 2 and 3 always movable, never fused (Fig. 53b); male first gonopods normal (Fig. 54b); aquatic to semiterrestrial crabs . . . . . → 32

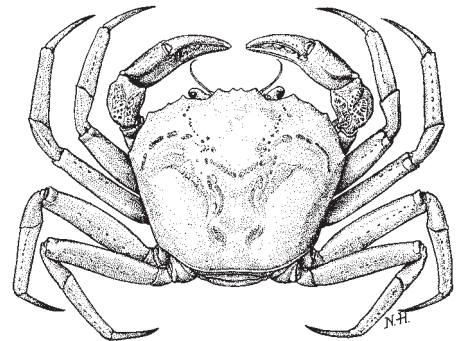


Fig. 52 Geryonidae

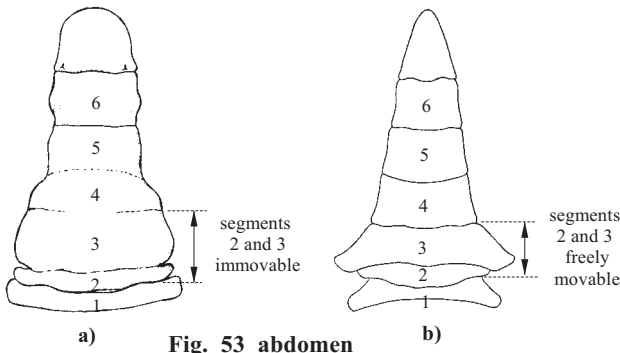


Fig. 53 abdomen

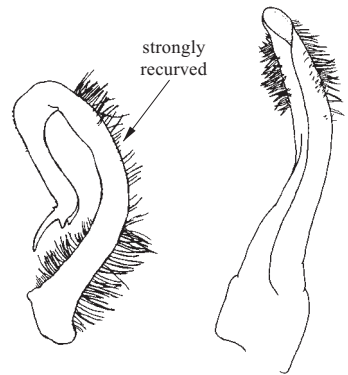


Fig. 54 male first gonopod

**32a.** Carapace squarish to longitudinally rectangular, posterolateral margins subparallel, dorsal surface flat or gently convex; free-living intertidal, estuarine, or freshwater crabs. . . . . → **33**

**32b.** Carapace shape not as above; dorsal surface usually convex; posterolateral margins gently to strongly converging; sublittoral to deep-water crabs . . . . . → **34**

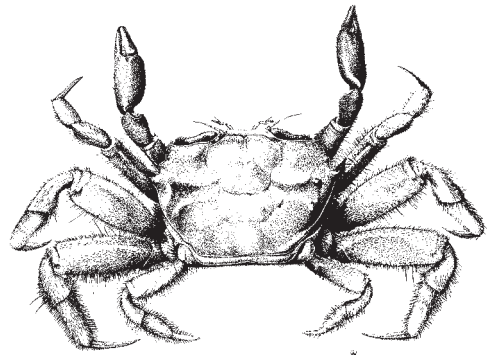


Fig. 55 Camptandriidae

**33a.** Front entire; third maxilliped with exopod well developed and long flagellum; male abdomen with 7 free segments (Fig. 56) . . . . . **Varunidae**

**33b.** Front with deep clefts; third maxilliped with exopod reduced, flagellum absent; male abdomen with segments 3 to 5 or 3 to 6 fused (Fig. 57) . . . . . **Plagusiidae**

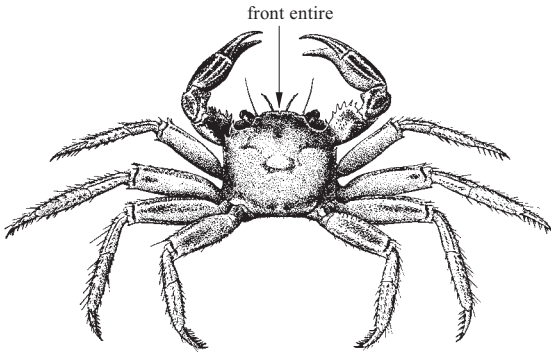


Fig. 56 Varunidae

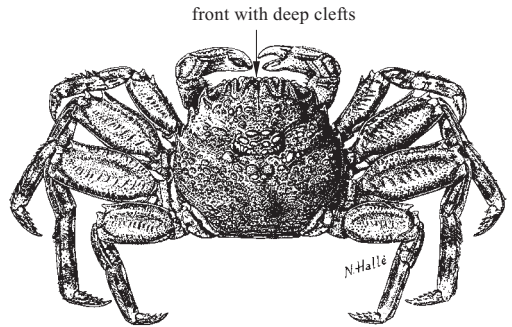
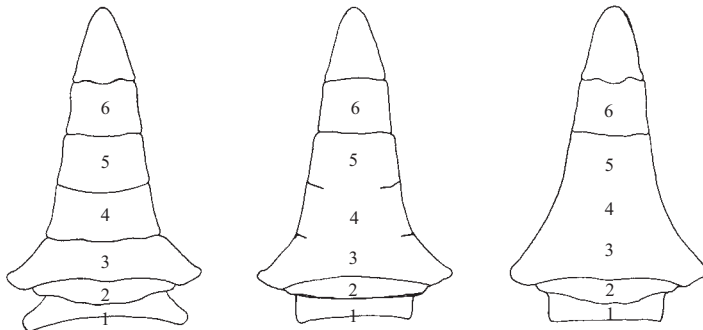


Fig. 57 Plagusiidae

**34a.** Male abdominal segments 3 to 5 distinct, movable (Fig. 58a) . . . . . → **35**

**34b.** Male abdominal segments 3 to 5 fused, immovable, although sutures may be partially visible (Fig. 58b, c) . . . . . → **37**



a) segments 3-5 freely movable

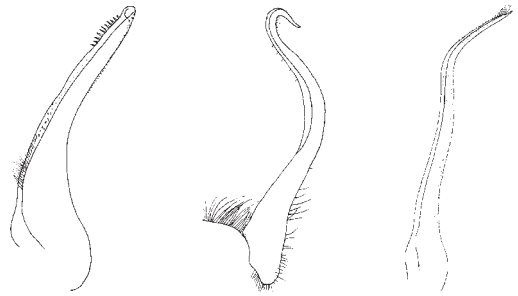
b) segments 3-5 fused (sutures visible laterally)

b) segments 3-5 completely fused

Fig. 58 male abdomen

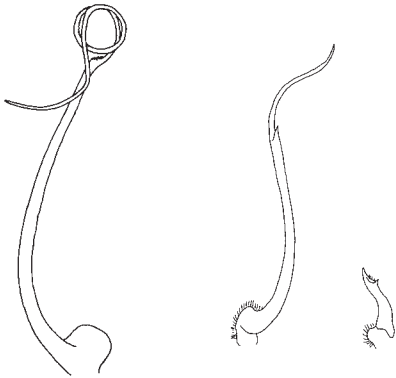
**35a.** Male first gonopod stout, straight (Fig. 59a); male second gonopod very elongate, subequal in length to, or longer than, male first gonopod (Figs 60a, b and 61) . . . . . **Menippidae**

**35b.** Male first gonopod slender to stout, slightly sinuous to almost straight (Fig. 59b); male second gonopod distinctly shorter than length of male first gonopod (Fig. 60c) . . . . . → **36**



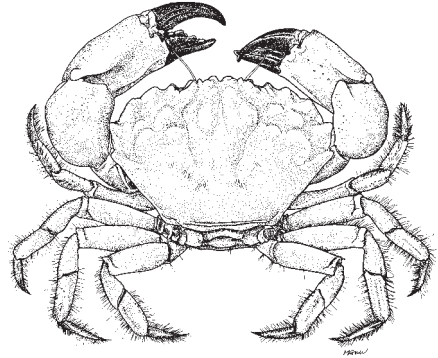
a) stout, straight    b) slender, sinuous    c) slightly sinuous

**Fig. 59** male first gonopod



a) very long, whip-like    b) long    c) very short

**Fig. 60** male second gonopod



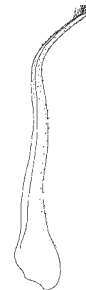
**Fig. 61** Menippidae

**36a.** Male first gonopod slender, distinctly sinuous to almost straight (Fig. 62a); male second gonopod sigmoid (very short, comma-shaped) (Figs 63a and 64) . . . **Pilumnidae**

**36b.** Male first gonopod moderately stout, slightly sinuous (Fig. 62b); male second gonopod about one-third to half length of male first gonopod (Figs 63b and 65) . . . . . **Goneplacidae (in part)**



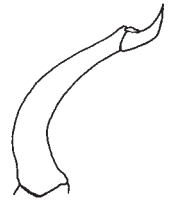
a) slender, sinuous



b) slightly sinuous



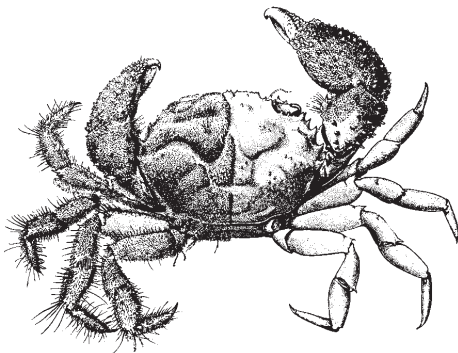
a) very short



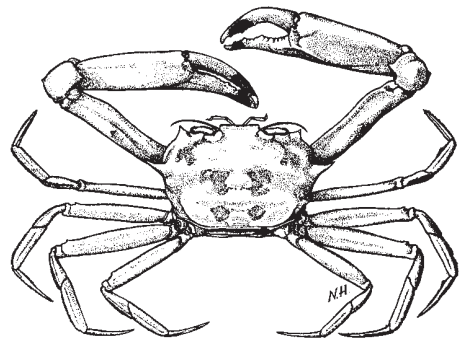
b) short

**Fig. 62** male first gonopod

**Fig. 63** male second gonopod



**Fig. 64** Pilumnidae



**Fig. 65** Goneplacidae

- 37a. Surface of carapace without traces of regions; walking legs with dactylo-propodal articulation formed by rounded prolongation of propodal lateral margin sliding against and beneath a projecting button situated proximally on lateral margin of dactylus (Fig. 66a); small crabs (carapace width about 4 mm) associated with corals (Fig. 67) . . . **Domeciidae**
- 37b. Surface of carapace with regions distinct; walking legs with dactylo-propodal articulation normal (Fig. 66b) . . . . . → **38**

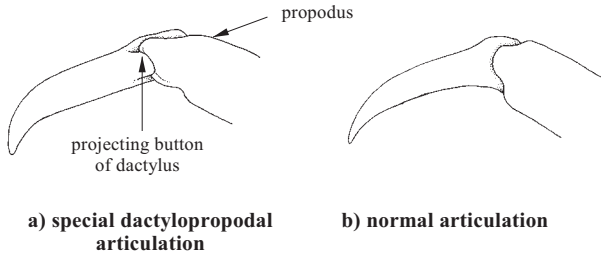


Fig. 66 dactylar articulation

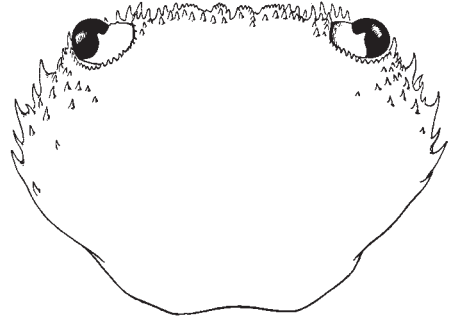


Fig. 67 Domeciidae

- 38a. Carapace usually transversely rectangular, subcircular, sometimes transversely ovate; male second gonopod usually 0.3 times the length, to subequal length, of male first gonopod (Figs 68a and 69) . . . . . **Goneplacidae (in part)**
- 38b. Carapace usually hexagonal or transversely ovate; male second gonopod short subequal to, or less than, 0.3 times the length of male first gonopod but not distinctly sigmoid (stout, comma-shaped) (Fig. 68b) . . . . . → **39**

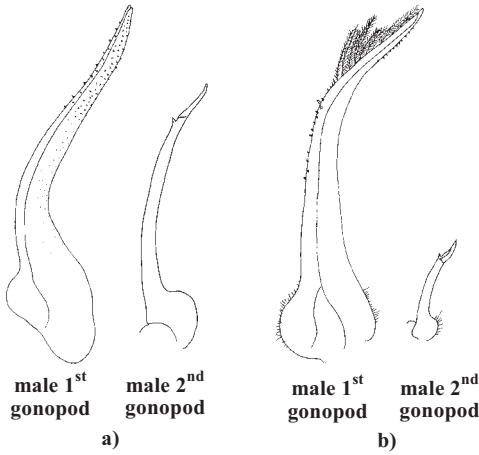


Fig. 68 relative length of male first and second gonopods

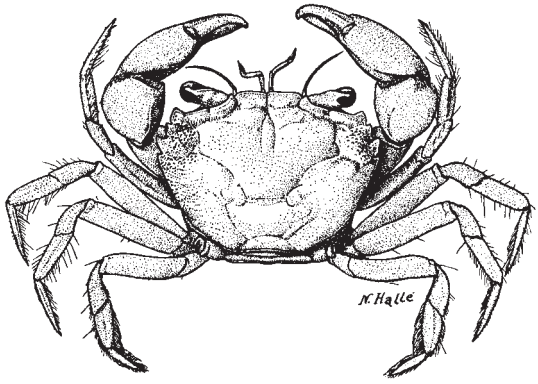
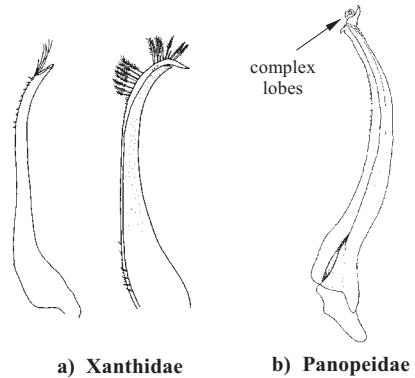


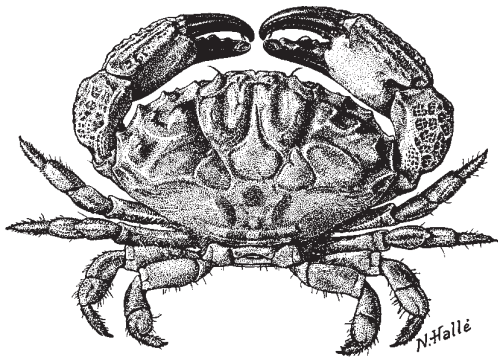
Fig. 69 Goneplacidae

**39a.** Male first gonopods very slender, usually S-shaped tip relatively simple, often with long setae subdistally and distally (Figs 70a and 71) . . . . . **Xanthidae**

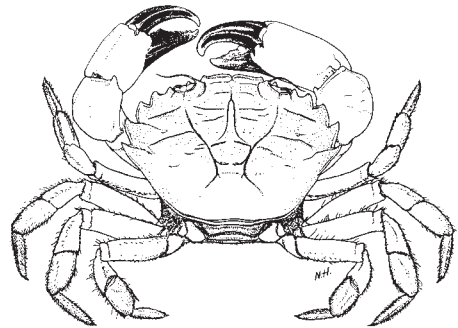
**39b.** Male first gonopods moderately stout, sometimes slightly sinuous, tip usually with numerous complex lobes and folds (Figs 70b and 72) . . . . . **Panopeidae**



**Fig. 70 male first gonopods**




**Fig. 71 Xanthidae**



**Fig. 72 Panopeidae**

**LIST OF FAMILIES OF BRACHYURAN CRABS OCCURRING IN THE AREA**

Classification according to Martin and Davis (2001).

The symbol  is given for those families which are treated further in this contribution.

**Infraorder BRACHYURA** Latreille, 1802

**Section DROMIACEA** de Haan, 1833.

**Superfamily CYCLODORIPPOIDEA** Ortmann, 1892.

CYMONOMIDAE Bouvier, 1897.

**Superfamily HOMOLODROMIOIDEA** Alcock, 1900.

HOMOLODROMIIDAE Alcock, 1900.

**Superfamily DROMIOIDEA** de Haan.

DROMIIDAE de Haan, 1833.

DYNOMENIDAE Ortmann, 1892.

**Superfamily HOMOLOIDEA** de Haan, 1839.

 HOMOLIDAE de Haan, 1839.

LATREILLIIDAE Stimpson, 1858.

**Section EUBRACHYURA** de Saint Laurent, 1980.

**Subsection RANINOIDA** de Haan, 1839.

**Superfamily RANINOIDEA** de Haan, 1839.

RANINIDAE de Haan, 1839.

**Superfamily CYCLODORIPPOIDEA** Ortmann, 1892.

CYMONOMIDAE Bouvier, 1897.

**Subsection HETEROTREMATA** Guinot, 1977.**Superfamily DORIPPOIDEA** MacLeay, 1838.

DORIPPIDAE MacLeay, 1838.

**Superfamily CALAPPOIDEA** Milne Edwards, 1837. CALAPPIDAE Milne Edwards, 1837.**Superfamily LEUCOSIOIDEA** Samouelle, 1819.

LEUCOSIIDAE Samouelle, 1819.

MATUTIDAE de Haan, 1841.

**Superfamily MAJOIDEA** Samouelle, 1819.

EPIALTIDAE MacLeay, 1838.

INACHIDAE MacLeay, 1838.

INACHOIDIDAE Dana, 1851.

 MAJIDAE Samouelle, 1819.

PISIDAE Dana, 1851.

**Superfamily HYMENOSOMATOIDEA** MacLeay, 1838.

HYMENOSOMATIDAE MacLeay, 1838.

**Superfamily PARTHENOPOIDEA** MacLeay, 1838.

AETHRIDAE Dana, 1851.

DALDORFIIDAE Ng and Rodriguez, 1986.

PARTHENOPIDAE MacLeay, 1838.

**Superfamily CANCROIDEA** Latreille, 1802.

ATELECYCLIDAE Ortmann, 1893.

 CANCRIDAE Latreille, 1802.

CORYSTIDAE Samouelle, 1819.

PIRIMELIDAE Alcock, 1899.

THIIDAE Dana, 1852.

**Superfamily PORTUNOIDEA** Rafinesque, 1815. GERYONIDAE Colosi, 1923. PORTUNIDAE Rafinesque, 1815.**Superfamily XANTHOIDEA** MacLeay, 1838.

DOMECIIDAE Ortmann, 1893.

GONEPLACIDAE MacLeay, 1838.

HEXAPODIDAE Miers, 1886.

 MENIPPIDAE Ortmann, 1893. PANOPEIDAE Ortmann, 1893.

PILUMNIDAE Samouelle, 1819.

XANTHIDAE MacLeay, 1838.

**Superfamily CRYPTOCHIROIDEA** Paulson, 1875.

CRYPTOCHIRIDAE Paulson, 1875.

**Subsection THORACOTREMATA** Guinot, 1977.**Superfamily PINNOTHEROIDEA** de Haan, 1833.

PINNOTHERIDAE de Haan, 1833.

**Superfamily OCYPODOIDEA** Rafinesque, 1815.

CAMPTANDRIIDAE Stimpson, 1858.

 OCYPODIDAE Rafinesque, 1815.

PALICIDAE Bouvier, 1898.

**Superfamily GRAPSOIDEA** MacLeay, 1838. GECARCINIDAE MacLeay, 1838. GRAPSIDAE MacLeay, 1838.

PLAGUSIIDAE Dana, 1851.

 SESARMIDAE Dana, 1851.

VARUNIDAE Milne Edwards, 1853.

**References**

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**Infraorder BRACHYURA**

**Section DROMIACEA**

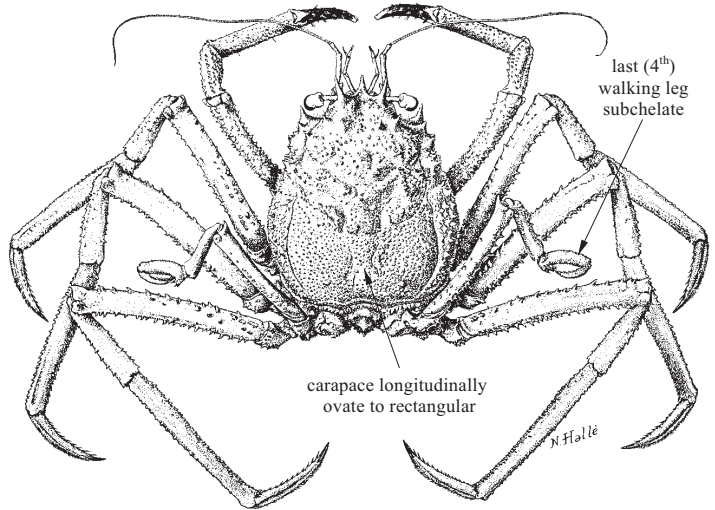
**Superfamily HOMOLOIDEA**

**HOMOLIDAE**

**Homolid crabs, paromolas**

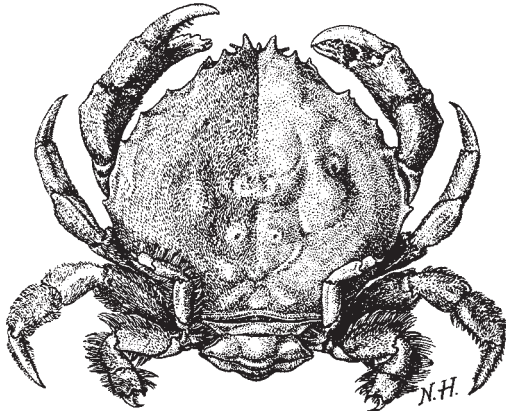
**D**iagnostic characters: Carapace longer than broad, longitudinally ovate to rectangular, with spines and hairs. Front narrow, usually with 3 long horn-like projections. Eyes on long articulated stalks. Male chelipeds long. Last (fourth) pair of legs slender, reduced, inserted obliquely on carapace and directed upwards; dactylus and propodus together forming a distinct subchela. Male abdominal segments distinct, movable.

**Habitat, biology, and fisheries:** Benthic deep-water crabs, usually occurring in larger depths. Species are of minor commercial interest, usually occasionally caught.

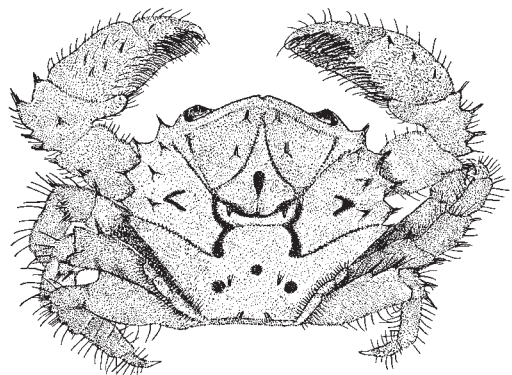


**Similar families present in the area**

There are several other families present in the area which have the last (fourth) pair of walking legs modified to carry objects: Dromiidae (sponge crabs), Homolodromiidae (deep-water sponge crabs), Dynomenidae, Latreillidae (spindle crabs), Cynomonidae and Dorippidae (porter crabs). Some Majidae are also similar to the Homolidae. All these families, however, differ markedly in body shape (not longer than broad and squarish) from the Homolidae.

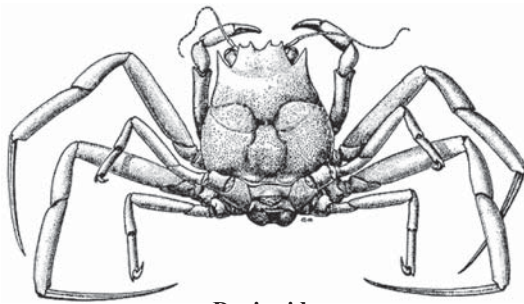


**Dromiidae**

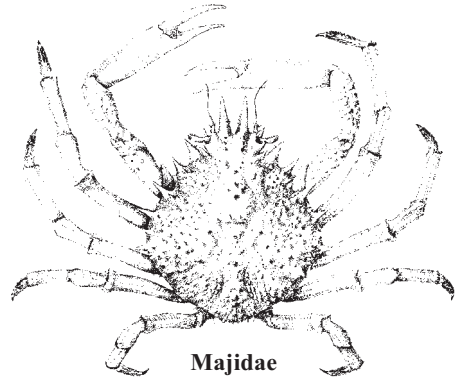


**Dynomenidae**





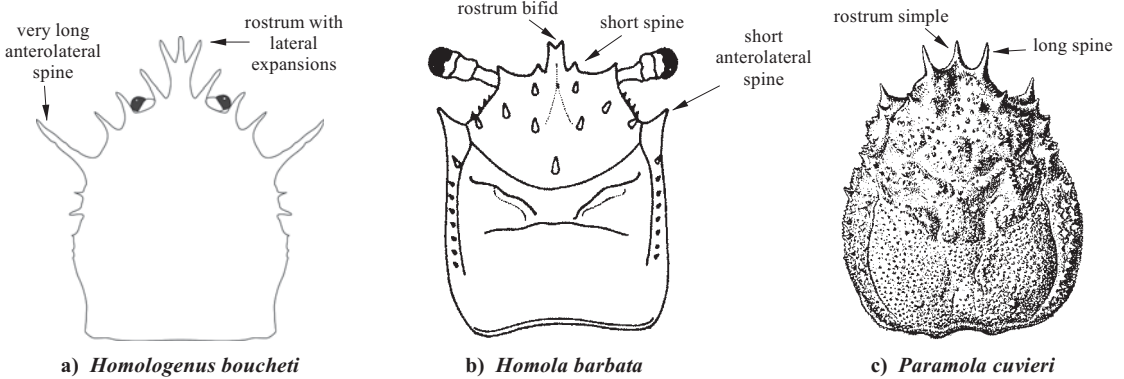
Dorippidae



Majidae

**Key to the species of Homolidae occurring in the area**

- 1a. Rostrum very long, with lateral expansions; a very long anterolateral spine on the carapace; small species (Fig. 1a) . . . . . *Homologenus boucheti*
- 1b. Rostrum simple; anterolateral spine small or absent; large species . . . . . → 2
- 2a. Carapace rectangular, sometimes slightly broader anteriorly than posteriorly; rostrum bifid, flanked by a short spine on both sides (Fig. 1b) . . . . . *Homola barbata*
- 2b. Carapace with slightly convex lateral borders; rostrum simple, flanked on both sides by spine of about same size (Fig. 1c) . . . . . *Paramola cuvieri*



**Fig. 1** carapace

**List of species occurring in the area**

The symbol is given when species accounts are included.

*Homola barbata* (Fabricius, 1793).

*Homologenus boucheti* Guinot and Richer de Forges, 1995.

*Paramola cuvieri* (Risso, 1816).

**References**

**Guinot, D. & Richer de Forges, B.** 1995. Crustacea Decapoda Brachyura: Révision de la famille des Homolidae de Haan, 1839. In A. Crosnier, ed. *Résultats des campagnes MUSORSTOM volume 13. Mémoires du Muséum national d'Histoire naturelle*, 163: 283–517, figs 1–76.

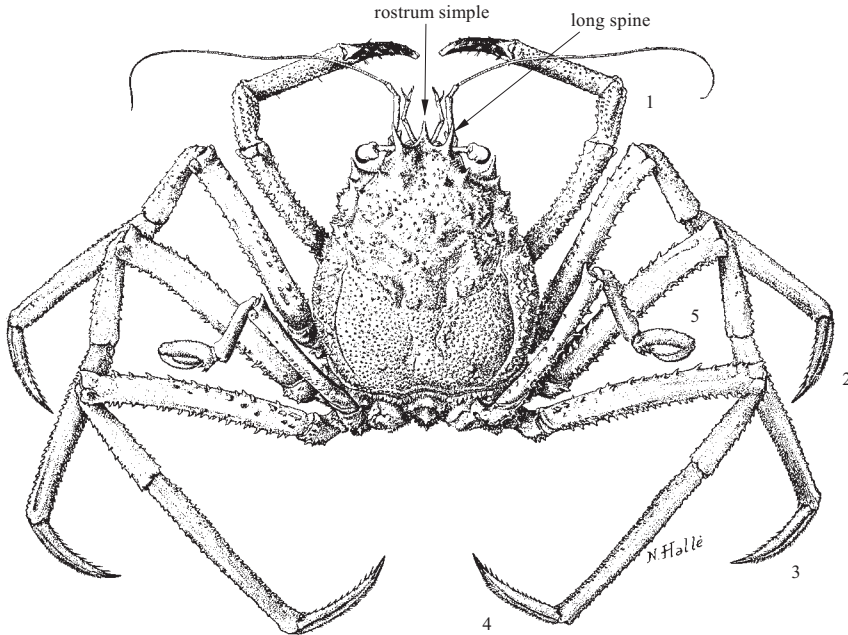
**Manning, R.B. & Holthuis, L.B.** 1981. West African brachyuran crabs (Crustacea: Decapoda). *Smithsonian Contributions to Zoology*, 306: 1–379.

**Monod, T.** 1956. Hippidea et Brachyura ouest-africains. *Mémoires de l'Institut Français d'Afrique Noire*, 45: 1–674.

***Paromola cuvieri* (Risso, 1816)**

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

**FAO names:** En – Paromola; Fr – Paromole; Sp – Paromola.



**Diagnostic characters:** Body high, longer than wide, about quadrangular in outline, covered with numerous spines. Rostrum a simple spine flanked by spine of same size; lateral margins convex, especially posteriorly. Chelipeds longer than body, strong, spinous, with tufts of hair on fingers; first 3 pairs of walking legs slender, spinous; dactyli normal, with spines; last leg much shorter than the others and carried on the back of the body, with a prehensile subchela formed by dactylus and propodus. **Colour:** light reddish or yellowish orange, spines and legs often darker red; fingers of chelipeds black.

**Size:** Maximum carapace length 21.5 cm.

**Habitat, biology, and fisheries:** A deep-water species, most commonly taken from depths between 80 and 350 m, but reported from 10 to 1 000 m. Not specially fished for; occasionally taken by trawlers. Taken in bottom trawls.

**Distribution:** East Atlantic: from Morocco to Angola, including offlying islands; northwards to the Hebrides and southwestern Norway. Mediterranean: as far east as Greece.



## Section EUBRACHYURA

## Subsection HETEROTREMATA

## Superfamily CALAPPOIDEA

## CALAPPIDAE

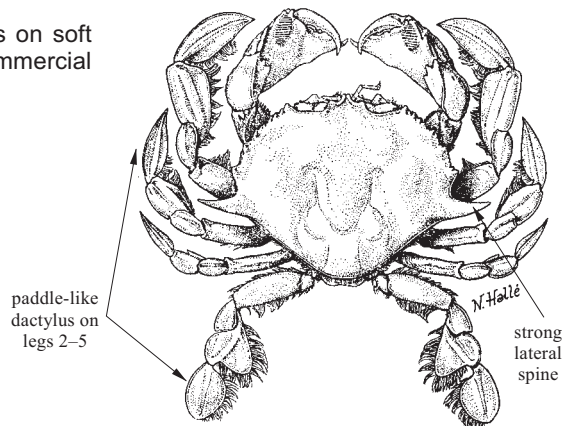
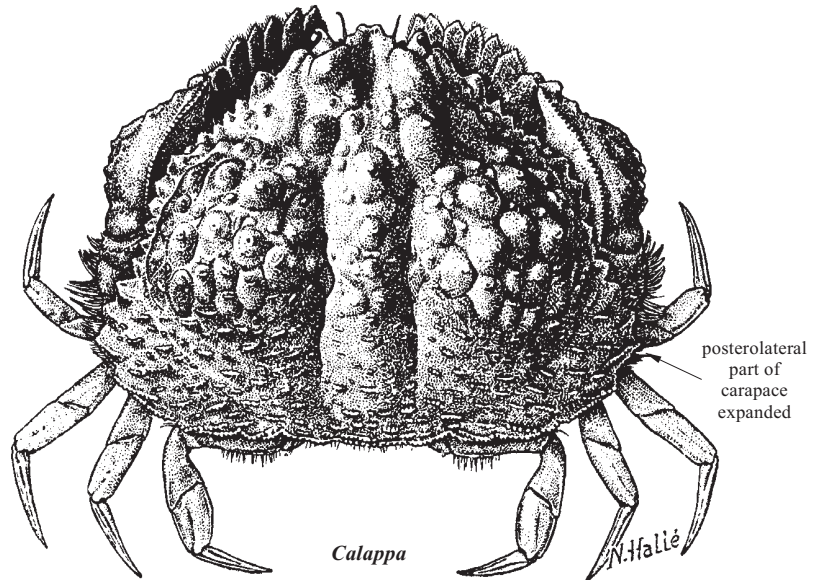
## Box crabs

**Diagnostic characters:** Carapace strongly convex, anterior and lateral margins forming a single arc; frontal margin triangular, narrow; postero-lateral parts forming clypeiform expansions over the legs, ending in broader or narrower teeth. **Merus of third maxillipeds distinctly triangular; opening for afferent respiratory current at base of chela, no canal present along sides of buccal cavern** even when third maxillipeds pushed aside. Chelipeds large and flattened, in a flexed position fitting exactly against the front of the body, eyes just looking over them; palm of chelae with high dorsal cock's comb-like crest; right (larger) chela with special tooth on base of pollex for peeling gastropods; last 4 pairs of legs similar, smooth; dactyls without spines or hairs, not paddle-like. **Male abdominal segments 3 to 5 completely fused.**

**Habitat, biology, and fisheries:** Burrowing crabs on soft and mud substrates. Most species of minor commercial importance.

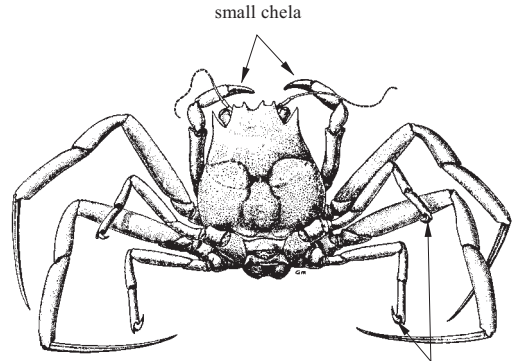
## Similar families occurring the area

Matutidae or Moon crabs: long considered a subfamily of the Calappidae incorporated into the Calappidae. Matutidae have a circular carapace, often with sharp lateral spines and flattened, paddle-like dactyli on the walking legs for swimming. In the area 1 species, *Mebeli michaelsoni*, is present.



Matutidae

Dorippidae (non-commercial): also with triangular meri of the third maxillipeds, but differ by having the last 2 pairs of legs small, inserted obliquely on carapace and directed upwards for carrying objects;

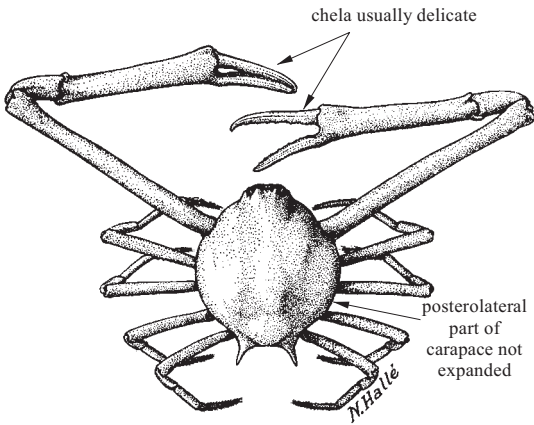


Dorippidae

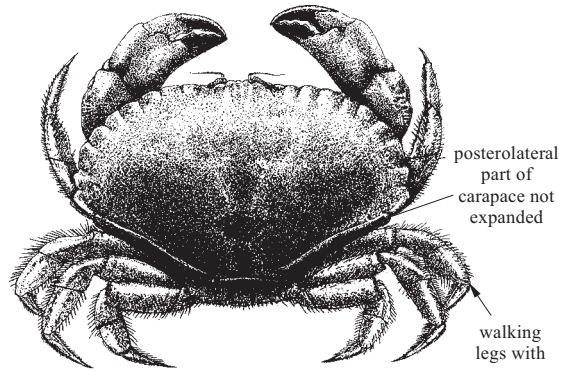
last 2 pairs of legs small, for carrying objects

Leucosiidae (non-commercial): small, pea-like crabs, also possess triangular meri of the third maxillipeds, but differ by having the opening for afferent respiratory current located below the orbits, adjacent to the endostome; a distinct canal present along sides of buccal cavern when third maxillipeds are pushed aside; sides of carapace never expanded into clypeiform process; chelae usually delicate, never with specialized teeth for opening mollusc shells.

Cancridae: large crabs with strong chela. Posterolateral part of carapace never expanded into clypeiform process. Walking legs always with stiff hairs.



Leucosiidae



Cancridae

**Key to the species of Calappidae occurring in the area**

- 1a. Posterolateral part of carapace expanded to form a clypeiform structure (= expanded posterior edge) which covers the legs (Figs 2 to 5) . . . . . → 2
- 1b. Carapace round or octogonal, posterolateral part of carapace never expanded, legs not covered (Figs 6 to 8 and 10) . . . . . → 5

- 2a. Front not bidentate, rostrum subtriangular, medially flattened (Fig. 1a); anterolateral margin of carapace strongly denticulate; posterior part of carapace with small series granules forming small transverse ridges (Fig. 2) . . . . . ***Calappa galloides***
- 2b. Front bidentate (Fig. 1b); antero-lateral margin of carapace indistinctly lobate; granules on posterior part of carapace never forming transverse ridges (Fig. 4) . . . . . → 3

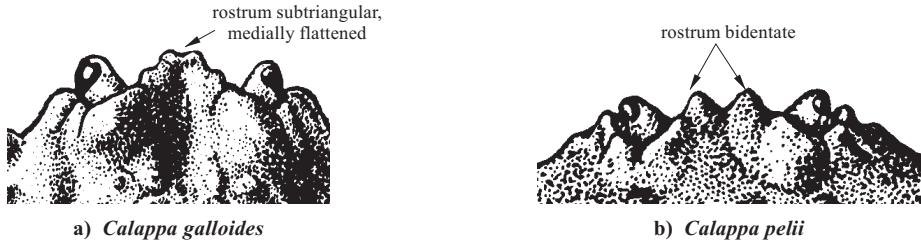


Fig. 1 front

- 3a. Carapace without distinct spots; strong submedial spiniform triangular tooth, directing posteriorly, on posterior margin of carapace (Fig. 3) . . . . . ***Calappa pelii***
- 3b. Carapace with distinct spots; no teeth on posterior margin of carapace . . . . . → 4

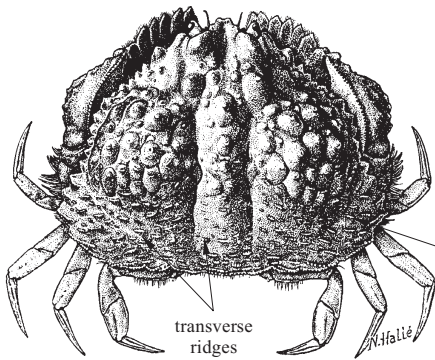


Fig. 2 *Calappa galloides*

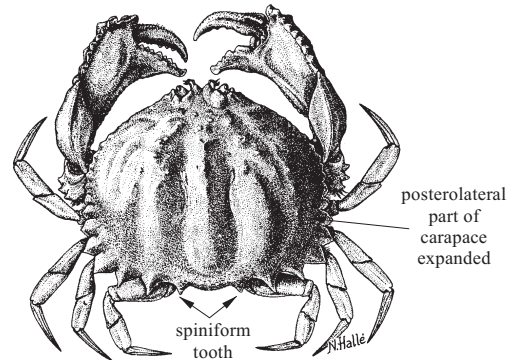


Fig. 3 *Calappa pelii*

- 4a. Dorsal surface of carapace with numerous red spots of various sizes, arranged in longitudinal rows (Fig. 4) . . . . . ***Calappa granulata***
- 4b. Dorsal surface of carapace with limited number of circular red spots, equal in size, arranged in transverse curved rows (Fig. 5). . . . . ***Calappa rubroguttata***

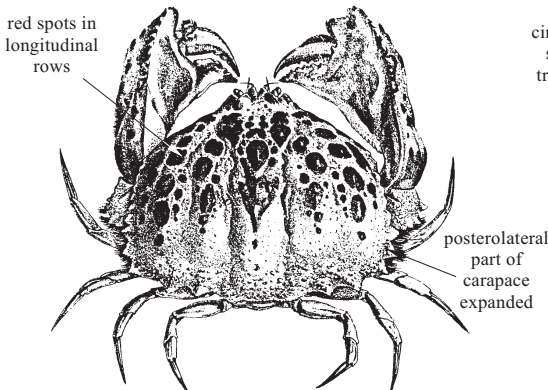


Fig. 4 *Calappa granulata*

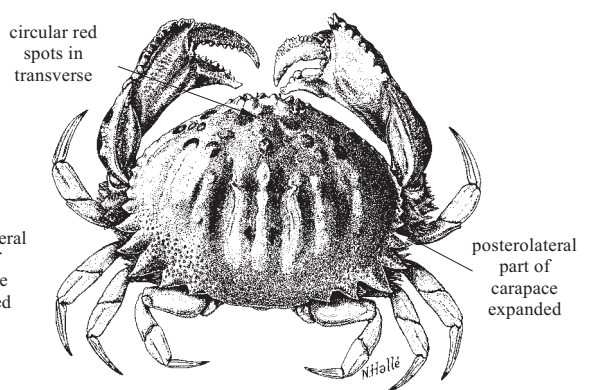


Fig. 5 *Calappa rubroguttata*

- 5a. Carapace with anterolateral spine (Figs 7, 8 and 10) . . . . . → 6
- 5b. Carapace without anterolateral spine (Fig. 6). . . . . ***Osachila stimpsonii***
- 6a. Carapace with a strong anterolateral spine; merus of cheliped with a strong lateral spine (Fig. 7) . . . . . → 7
- 6b. Carapace with a small spine in the middle of the lateral margin; merus of the cheliped with a small lateral spine (Fig. 8) . . . ***Cryptosoma cristatum***

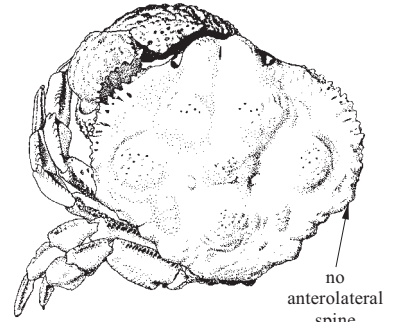


Fig. 6 *Osachila stimpsonii*

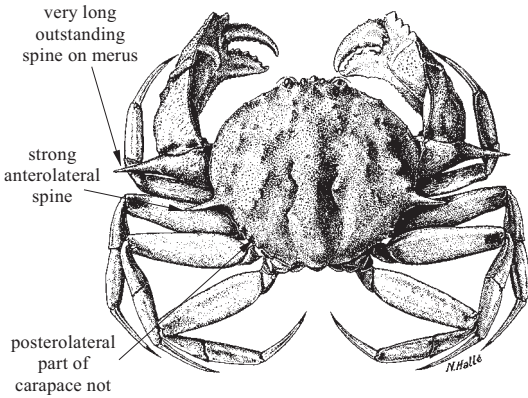


Fig. 7 *Acanthocarpus brevispinis*

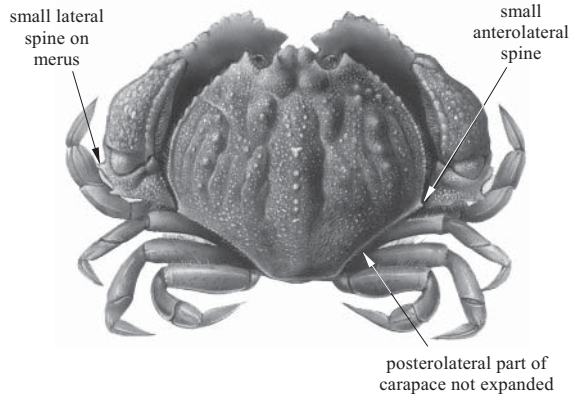
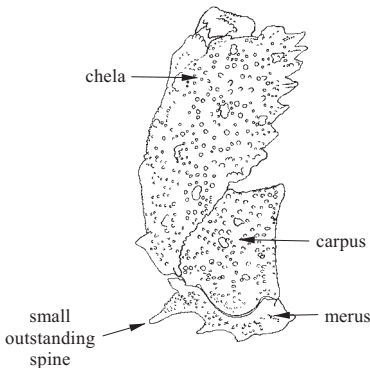


Fig. 8 *Cryptosoma cristatum*

- 7a. Merus of cheliped with very long outstanding spine (Fig. 7) . . . . . ***Acanthocarpus brevispinis***
- 7b. Merus of cheliped with small outstanding spine (Fig. 9) . . . . . → 8
- 8a. Posterior border of carapace evenly rounded; merus of cheliped with 2 teeth, palm with 2 teeth (Fig. 10a) . . . . . ***Mursia cristiata***
- 8b. Posterior border of carapace trilobed; merus of cheliped with 3 teeth, palm with 1 tooth (Fig. 10b) . . . . . ***Mursia mcdowellii***



*Mursia mcdowellii*  
Fig. 9 left chela

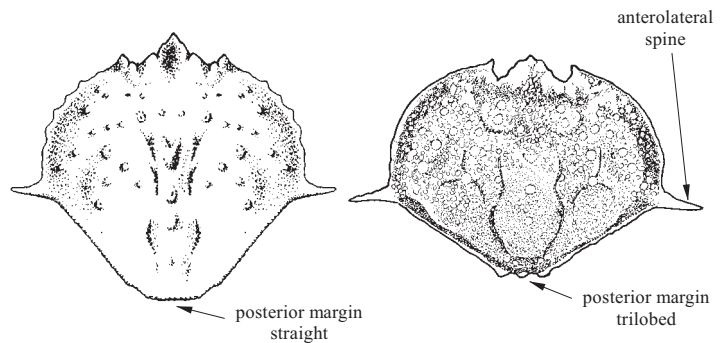




Fig. 10 carapace

**List of species of Calappidae occurring in the area**


The symbol  is given when species accounts are included.

*Acanthocarpus brevispinis* Monod, 1946.

 *Calappa galloides* Stimpson, 1859.

 *Calappa granulata* (Linnaeus, 1758).

 *Calappa pelii* Herklots, 1851.

 *Calappa rubroguttata* Herklots, 1851.

*Cryptosoma cristatum* Brullé, 1837.

*Mursia cristiata* H. Milne Edwards, 1837.

*Mursia mcdowellii* Manning and Chace, 1990 [Ascension].

*Osachila stimpsonii* Studer, 1883<sup>1/</sup> [Ascension].

**References**

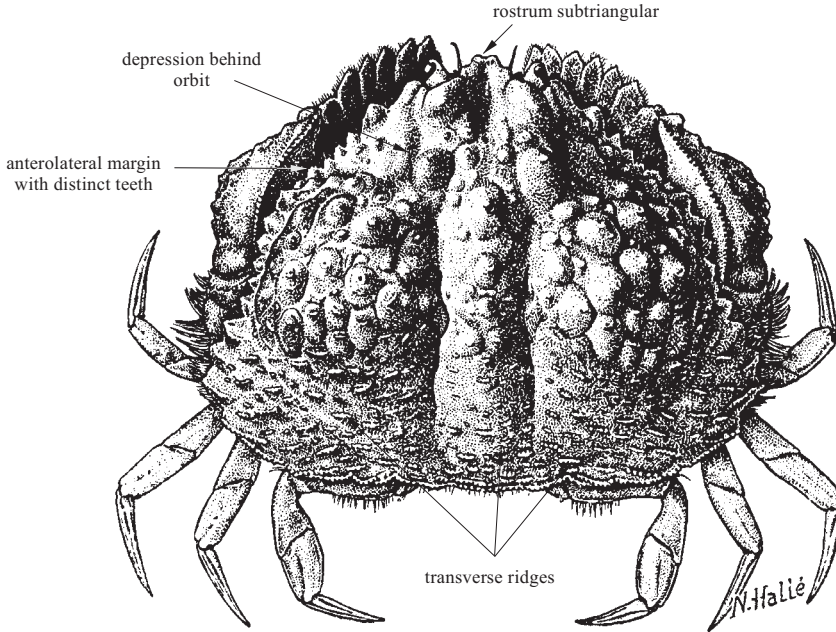
- Galil, B.S.** 1993. Crustacea Decapoda: A revision of the genus *Mursia* Desmaret, 1823 (Calappidae). In A. Crosnier, ed. *Résultats des campagnes MUSORSTOM, vol. 10. Mémoires du Muséum national d'Histoire naturelle, Paris (A)*, 156: 347–379, figs 1–13.
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- Manning, R.B. & Chace, F.A.** 1990. Decapod and stomatopod Crustacea from Ascension Island, South Atlantic Ocean. *Smithsonian Contributions to Zoology*, 503: 1–91.
- Manning R.B. & Holthuis, L.B.** 1981. West African brachyuran crabs (Crustacea: Decapoda). *Smithsonian Contributions to Zoology*, 306: 1–379.
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- Ng, P.K.L., Guinot, D. & Davie, P.J.F.** 2008. Systema Brachyurorum: Part I. An annotated checklist of extant brachyuran crabs of the world. *The Raffles Bulletin of Zoology*, supplement 17: 1–286.

<sup>1/</sup> Listed by Manning and Holthuis (1990) among the Calappidae. Placed into the Aethridae Dana, 1851 by Ng *et al.* (2008).

***Calappa galloides* Stimpson, 1859**

**Frequent synonyms / misidentifications:** None / *Calappa gallus* (Herbst, 1803).

**FAO names:** **En** – Yellow box crab; **Fr** – Migraine jaune; **Sp** – Calapa amerilla.



**Diagnostic characters:** Body strongly convex, **carapace bluntnly triangular, not semicircular, with a distinct depression behind each orbit**; anterior part of carapace irregularly tuberculate, **posterior part with numerous sharp and short transverse ridges formed by rows of granules**; **anterolateral carapace margin with distinct teeth, posterior carapace margin with a few incisions, but without conspicuous teeth. Rostrum subtriangular, not bidentate.** **Colour:** upper surface orange to orange brown with irregular dark red or dark reddish brown spots; lower surface yellow.

**Size:** Maximum carapace length to about 6 cm, carapace width to about 8 cm.

**Habitat, biology, and fisheries:** This crab burrows in sand or slightly muddy sand, usually in shallow coastal waters, but it has also been reported from depths down to 200 m. No special fishery for this species. The species is not positively known to be of economic value, but is listed by Monod (1967, *Mém.Inst.Fond.Afrique Noire*, 77: 178) to be a possible source of food in West Africa.

**Distribution:** Eastern Atlantic: from Senegal to Angola, Canary Islands, Cape Verde Islands, São Tomé and Ilha do Principe, Ascension, St Helena. Western Atlantic: Florida Keys to Brazil.

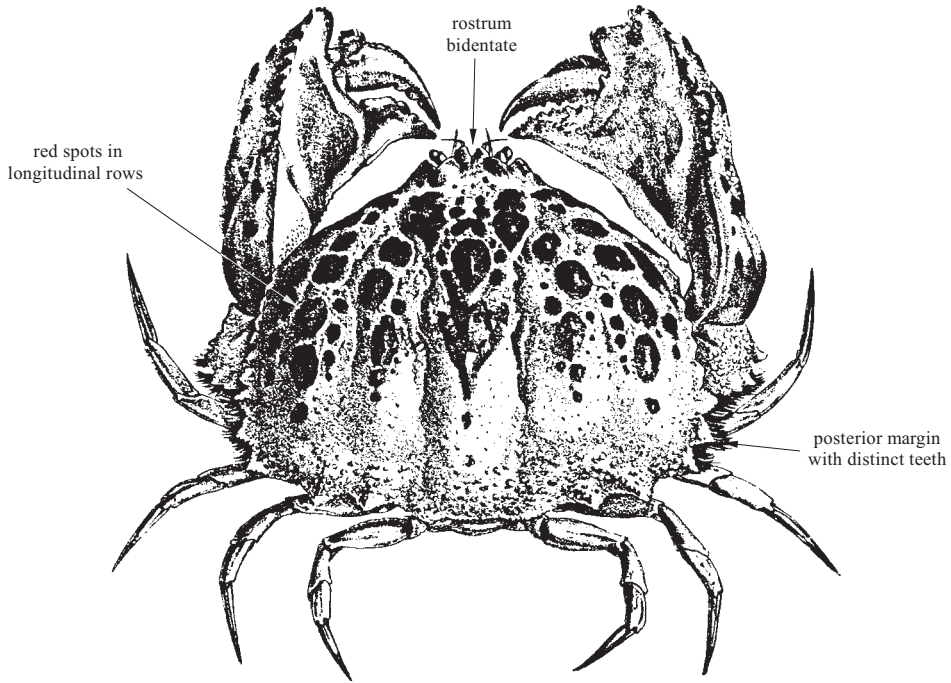




***Calappa granulata*** (Linnaeus, 1758)

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

**FAO names:** En – Shamefaced crab; Fr – Crabe honteux; Sp – Calapa real.



**Diagnostic characters:** Body strongly convex, anterior half rather semicircular in outline; posterior margin transverse with distinct, but broad and rather short teeth; upper surface of carapace tuberculate and minutely shagreened, but without transverse granular ridges. Rostrum bidentate. **Colour:** yellowish, anterior half of dorsal surface with numerous (about 12), sometimes irregular, longitudinal rows of larger and smaller red spots extending on to the posterior half; chelipeds with several large red spots; legs yellow.

**Size:** Maximum carapace length 7 cm, carapace width to 9.2 cm.

**Habitat, biology, and fisheries:** Burrows in sand at depths ranging from 13 to 400 m, usually from 30 to 150 m. No special fishery throughout its range. Caught in trawls and vertical nets, usually as a byproduct of other fisheries. Marketed fresh. Sold frequently in the markets of Morocco, but not highly esteemed as food.

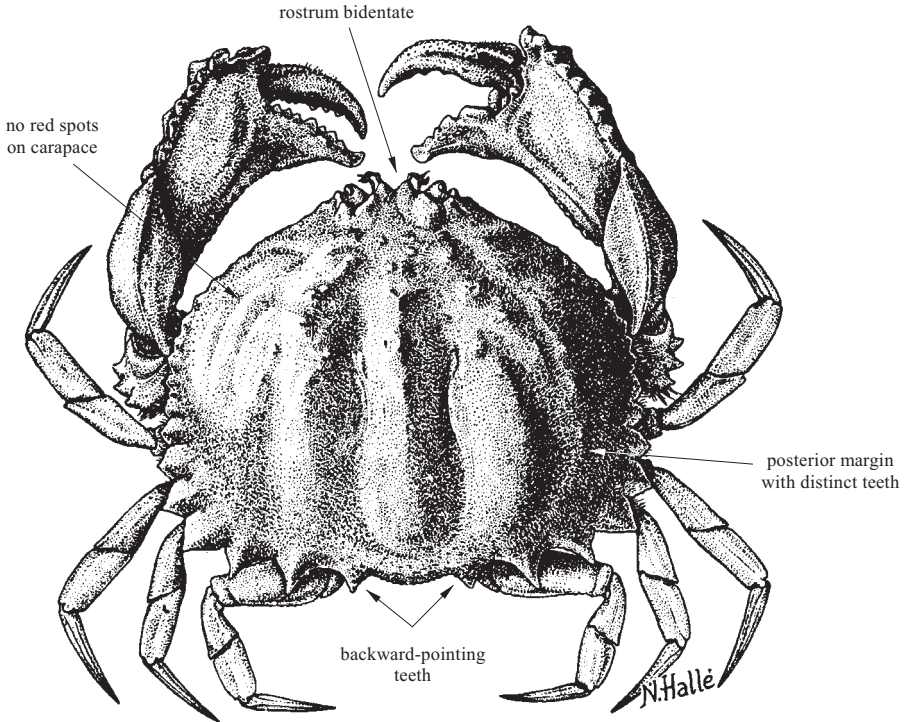
**Distribution:** Eastern Atlantic: coast of Morocco and Western Sahara, Madeira, Selvages, Canary Islands and Cape Verde Islands; northward extending to the Azores and the coast of Portugal, northwestern Spain and southwestern France. Mediterranean: as far east as Israel.



*Calappa pelii* Herklots, 1851

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

**FAO names:** En – Spiny box crab; Fr – Migraine épineuse; Sp – Calapa espinuda.



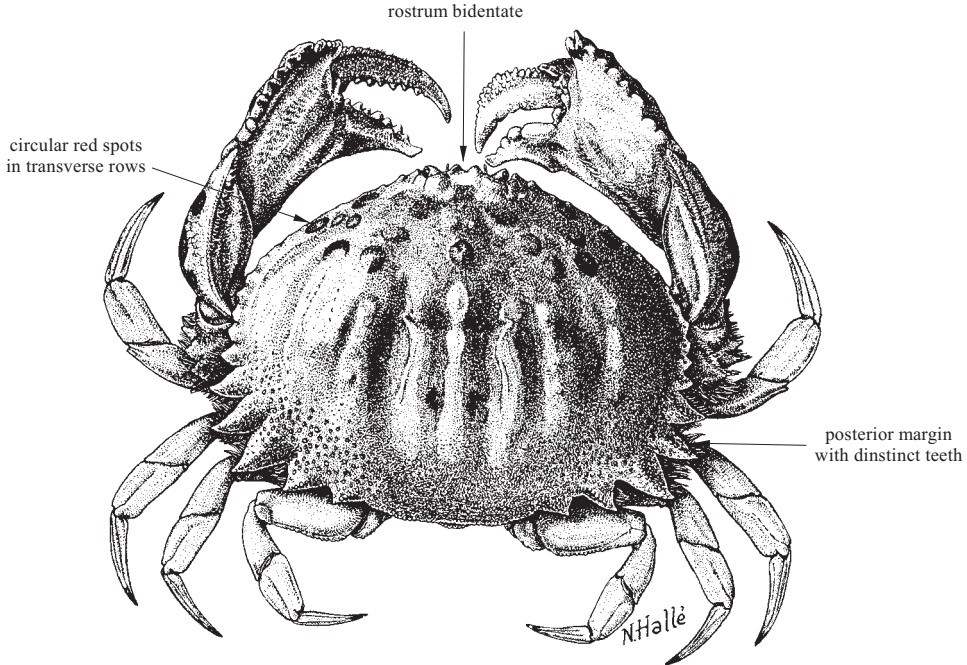
**Diagnostic characters:** Body strongly convex. **Anterior margin of carapace semicircular; posterior margin convex with distinct, sharp, backward-pointing teeth; dorsal surface finely granular, without transverse granular ridges. Rostrum bidentate. Colour:** carapace brownish or reddish, irregularly marbled or spotted with very small spots, **no striking colour pattern.**

**Size:** Maximum carapace length 7.6 cm, carapace width to 9.6 cm.

**Habitat, biology, and fisheries:** Burrows in mud or sandy mud at depths from 12 to 400 m, usually between 50 and 150 m; a species occurring deeper than the other West African *Calappa* species. No special fishery. No information, but the species is reported by Monod (1967, *Mém.Inst.Fond.Afrique Noire*, 77:178) as of possible commercial value.

**Distribution:** West Africa from the Western Sahara to Angola.



***Calappa rubroguttata* Herklots, 1851****Frequent synonyms / misidentifications:** None / None.**FAO names:** En – Spotted box crab; Fr – Migraine maculée; Sp – Calapa manchada.

**Diagnostic characters:** Body strongly convex, without a depression behind the orbits; **anterior margin semicircular**; posterolateral margins with distinct teeth, **but no slender, backward-pointing teeth on posterior margin**; dorsal surface with smaller and larger granules, **but no transverse granular ridges present**. **Rostrum bidentate**. **Colour:** yellowish; anterior half of carapace with **two curved, parallel rows of sharply defined, large, rounded, red spots of about equal size**; **several longitudinal red streaks in the posterior half**; red spots also present on palm and carpus of chelipeds.

**Size:** Carapace length to 7.9 cm, carapace width to 10.8 cm.

**Habitat, biology, and fisheries:** Burrowing in sand or fine gravel, but also known from bottoms with other sediments at depths ranging from 0 to 90 m, usually between 4 and 40 m. No special fishery. Caught with vertical nets or in beach seines. Claws and part of the body are used as food. Some parts of the body may be noxious and can act as a strong purgative. In Ghana such parts are eaten for purgative purposes (Irvine, 1947, *The Fishes and Fisheries of the Gold Coast*: 301). Some people in Ghana eat only the claws of the species, evidently to avoid the noxious parts. In this connection the remark by Osorio (1889, *Journal Sci. math. phys. nat. Lisboa*, (2)1:135) that at São Tomé this species is “considerée venimeuse par les indigènes”, is of special interest. There are also other reports that consumption of parts, other than the claws, of *Calappa* may cause violent sickness.

**Distribution:** Eastern Atlantic: from Senegal to Angola.

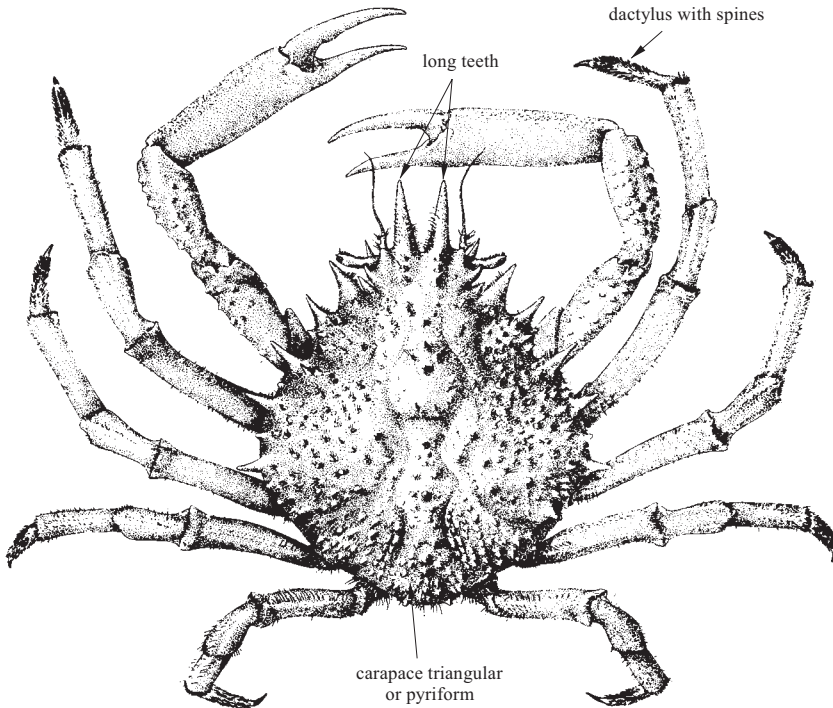


## Superfamily MAJOIDEA

### MAJIDAE

#### Spider crabs

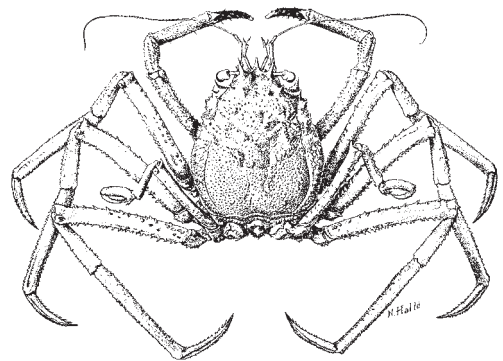
**Diagnostic characters:** Carapace narrowed anteriorly, usually triangular or pyriform in shape, **often with spines**; **front produced between the eyes, usually ending in 2 long teeth**, which are separated or close together; anterolateral margin often with spines or teeth; last 4 pairs of pereopods similar (except in length), usually hairy and spiny, dactylus with spines. Both carapace and legs often with hooked setae. Vulvae of adult female on thoracic sternum.



**Habitat, biology, and fisheries:** Benthic crabs occurring in shallow to deep water mostly on bottoms with hard substrate or algae. Many species decorate themselves by attaching algae, sponges or tunicates to hooked-shaped setae on carapace and legs. Only 1 species (*Maja brachydactyla*) belonging to the family Majidae of minor commercial importance.

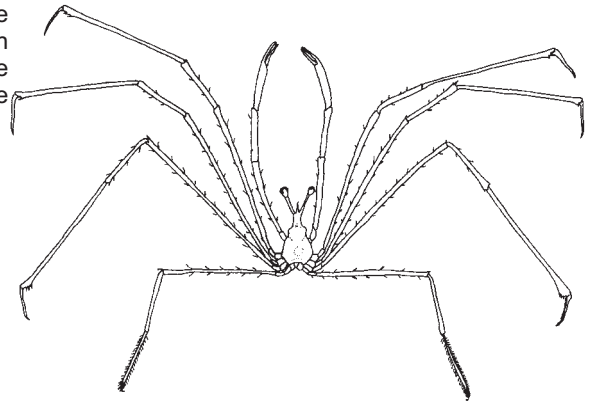
#### Similar families occurring in the area

Homolidae resemble some majoid crabs. Their carapace is longitudinally ovate to rectangular but not pyriform as in the Majoidea. They never have hooked setae on carapace or legs. The vulvae of adult females is located on the coxa of the third legs, not on the thoracic sternum as in majoids.



**Homolidae**

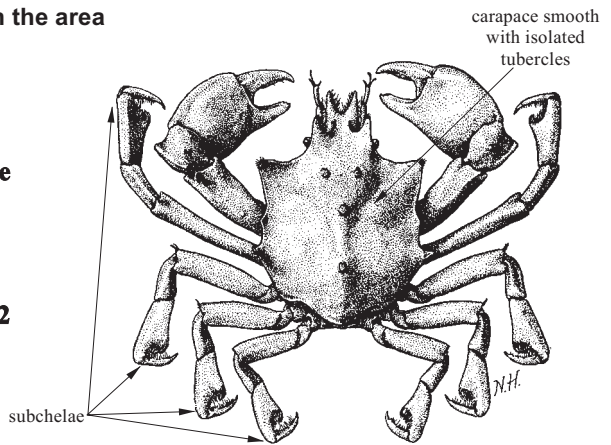
Latreilliidae resemble some majoid species of the genera *Macropodia* and *Sternorhynchus* which possess very long and slender legs. However, the Latreilliidae have a very long basal article of the eyestalk which is missing in the Majoidea.



Latreilliidae

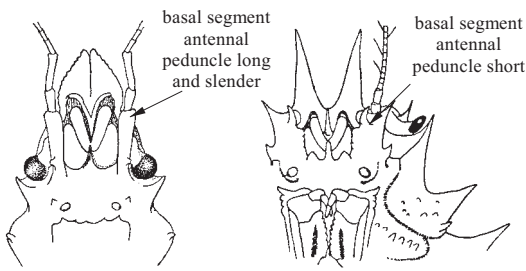
**Key to the families of Majoidea occurring in the area**

- 1a. All walking legs with subchelae, dactylus recurved against tooth on propodus; carapace smooth except for several isolated tubercles (Fig. 1) . . . . . **Epialtidae**
- 1b. At most last 2 pairs of walking legs with subchelae, never with large tooth on propodus; carapace covered by spines and/or tubercles (Figs 3, 5 and 6) . . . . . → 2
- 2a. Basal segment of antenna long and slender (Fig. 2a); eyes without orbits; walking legs long and slender (Fig. 3) . . . . . **Inachidae**
- 2b. Basal segment of antenna short and broad (Fig. 2b); eyes with commencing, nearly complete, or complete orbits, formed by a supra-orbital eave; walking legs short and stout (Figs 5 and 6) . . . . . → 3



(*Acanthonyx*)

Fig. 1 Epialtidae



a) Inachidae  
ventral view

b) Majidae

Fig. 2 anterior part

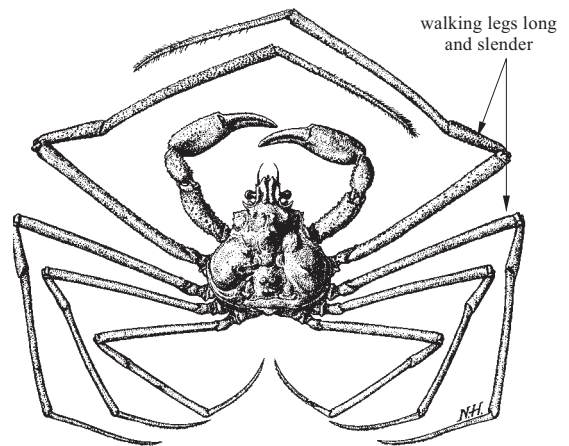


Fig. 3 Inachidae

- 3a. Postocular tooth or lobe usually cupped, to receive retracted eyestalk; orbits incomplete (Figs 4a and 5) . . . . . **Pisidae**
- 3b. Postocular spine at most slightly cupped; orbits complete, formed by 1 supraocular, 1 intercalated and 1 postocular spine (Figs 4b and 6) . . . . . **Majidae**

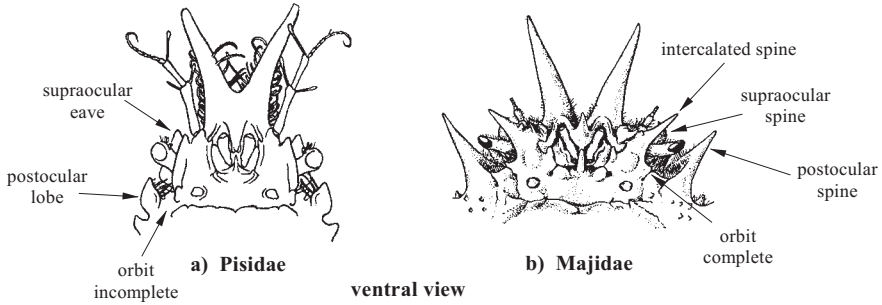


Fig. 4 anterior region

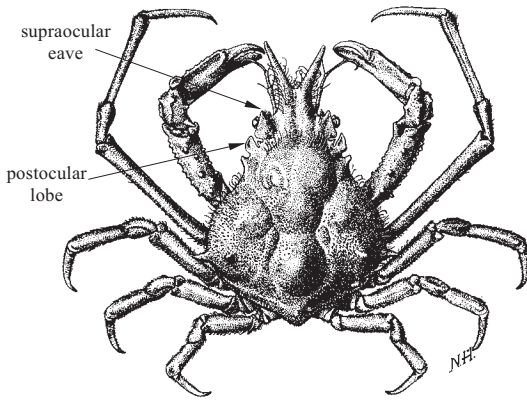


Fig. 5 Pisidae

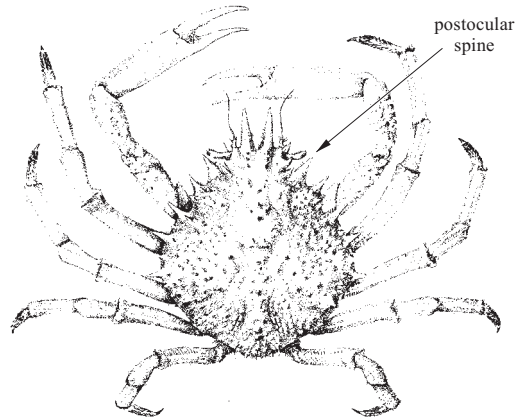


Fig. 6 Majidae

**Key to the species of Majidae occurring in the area**

- 1a. Walking legs unarmed, without dorsodistal spine on merus (Figs 8 and 9). . . . . → 2
- 1b. Walking legs armed with strong dorsodistal spine on merus (Fig. 7) . . . . . ***Maja goltziana***

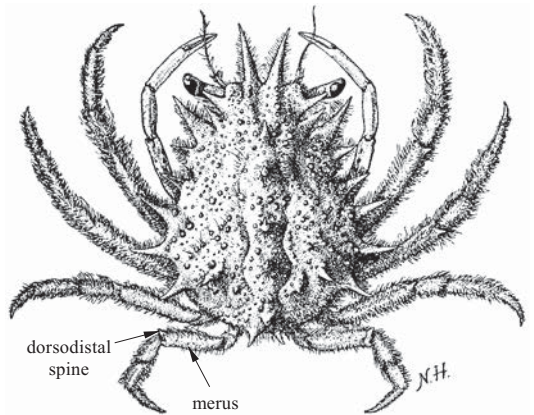


Fig. 7 *Maja goltziana*

- 2a. Dorsal surface of carapace with strong spines, strongly convex, slightly broader than long in large specimens; large crab, maximum carapace length 22 cm (Fig. 8) . . . ***Maja brachydactyla***
- 2b. Dorsal surface of carapace with tubercles, depressed near lateral margins, always longer than broad; moderately sized crab, maximum carapace length 8 cm (Fig. 9) . . . . . ***Maja crispata***

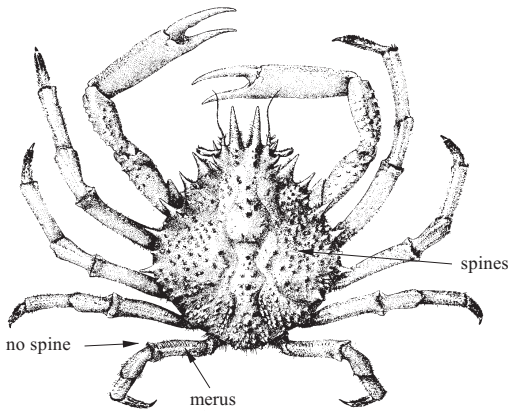


Fig. 8 *Maja brachydactyla*

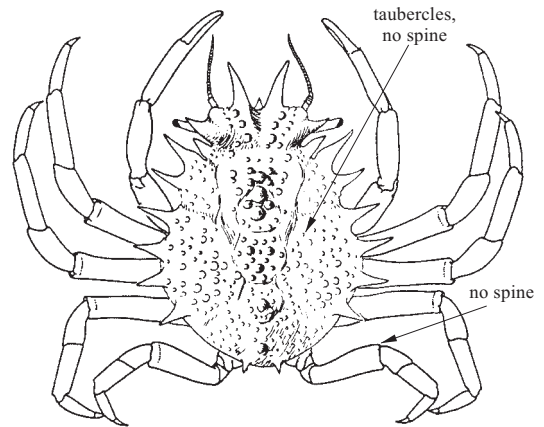



Fig. 9 *Maja crispata*

**List of species of Majoidea occurring in the area** (Subdivision according to Manning and Holthuis, 1981)

The symbol  is given when species accounts are included.

**EPIALTIIDAE** MacLeay, 1838


- Acanthonyx brevifrons* A. Milne Edwards, 1869.  
*Acanthonyx depressifrons* Manning and Holthuis, 1981.  
*Acanthonyx lunulatus* (Risso, 1816).  
*Acanthonyx minor* Manning and Holthuis, 1981.

**INACHIDAE** MacLeay, 1838

- Achaeus buderes* Manning and Holthuis, 1981.  
*Achaeus cranchii* Leach, 1817.  
*Achaeus foresti* Monod, 1956.  
*Achaeus gracilis* (O. Costa, 1839).  
*Achaeus monodi* (Capart, 1951).  
*Achaeus trifalcatus* Forest and Guinot, 1966.  
*Achaeus turbator* Manning and Holthuis, 1981.  
*Calypsachaeus calypso* (Forest and Guinot, 1966).  
*Capartiella longipes* (Capart, 1951).  
*Dorhynchus thomsoni* Thomson, 1873.  
*Ergasticus clouei* Studer, 1883.  
*Inachus aguiarii* De Brito Capello, 1876.  
*Inachus angolensis* Capart, 1951.  
*Inachus biceps* Manning and Holthuis, 1981.  
*Inachus dorsettensis* (Pennant, 1777).  
*Inachus grillator* Manning and Holthuis, 1981.  
*Inachus guentheri* (Miers, 1879).  
*Inachus leptochirus* Leach, 1817.

- Inachus nanus* Manning and Holthuis, 1981.  
*Inachus phalangium* (Fabricius, 1775).  
*Inachus thoracicus* (Roux, 1830).  
*Macropodia doracis* Manning and Holthuis, 1981.  
*Macropodia gilsoni* (Capart, 1951).  
*Macropodia hesperiae* Manning and Holthuis, 1981.  
*Macropodia intermedia* Bouvier, 1940.  
*Macropodia longicornis* (A. Milne Edwards and Bouvier, 1899).  
*Macropodia longipes* (A. Milne Edwards and Bouvier, 1899).  
*Macropodia macrocheles* (A. Milne Edwards and Bouvier, 1898).  
*Macropodia spinulosa* (Miers, 1881) (= *M. rostrata* sensu Ng *et al.*, 2008).  
*Macropodia straeleni* Capart, 1951.  
*Stenorhynchus lanceolatus* (Brullé, 1837).

#### **MAJIDAE** Samouelle, 1819

-  *Maja brachydactyla* Balss, 1922.  
*Maja crispata* Risso, 1827.  
*Maja goltziana* d'Oliveira, 1888.

#### **PISIDAE** Dana, 1851

- Apiomithrax bocagei* (Osorio, 1887).  
*Apiomithrax violaceus* (A. Milne Edwards, 1867).  
*Eurynome aspera* (Pennant, 1777).  
*Eurynome parvirostris* Forest and Guinot, 1966.  
*Herbstia condyliata* (Fabricius, 1787).  
*Herbstia nitida* Manning and Holthuis, 1981.  
*Herbstia rubra* A. Milne Edwards, 1869.  
*Micropisa ovata* Stimpson, 1858.  
*Pisa armata* (Latreille, 1803).  
*Pisa calva* Forest and Guinot, 1966.  
*Pisa carinimana* Miers, 1879.  
*Pisa nodipes* (Leach, 1815).  
*Pisa tetraodon* (Pennant, 1777).  
*Rochinia carpenteri* (Thomson, 1873).

#### **References**

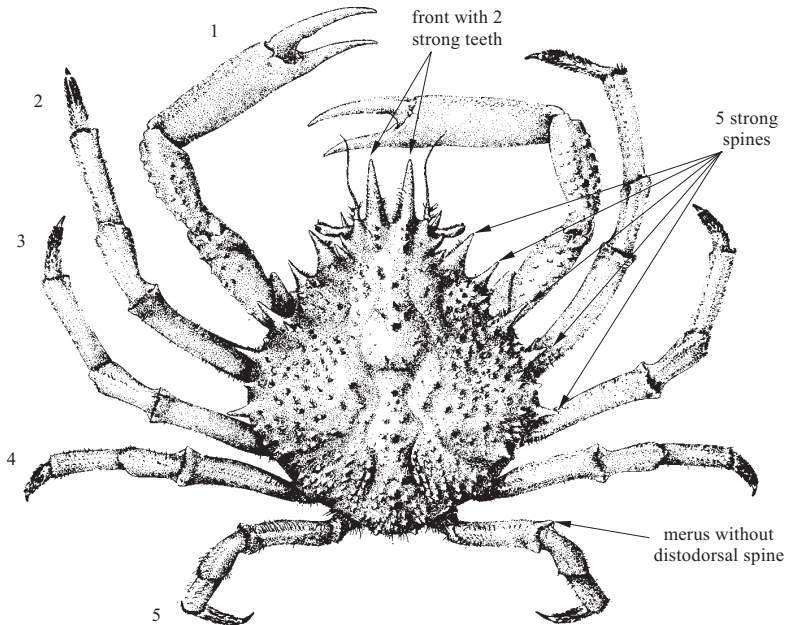
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- Ng, P.K.L., Guinot, D. & Davie, P.J.F.** 2008. Systema Brachyurorum: Part I. An annotated checklist of extant brachyuran crabs of the world. *The Raffles Bulletin of Zoology*, supplement 17: 1–286.



***Maja brachydactyla*** Balss, 1922

**Frequent synonyms / misidentifications:** None / *Maja squinado* sensu Capart, 1951; Monod, 1956; Manning and Holthuis, 1981 (non Herbst, 1788).

**FAO names:** **En** – Atlantic spinous spider crab; **Fr** – Araignée atlantique; **Sp** – Centolla atlantica.



**Diagnostic characters:** Carapace strongly vaulted, rounded, narrowing anteriorly, **greatest width behind the middle**, slightly broader than long in large specimens, covered with numerous spines and granules, surface hairy. **Front ending in 2 strong divergent tooth**, which project beyond the outline of the carapace; lateral margins with 5 large and some small spinous teeth, including the postocular tooth. Pincers smooth, without spines, much longer and stronger in males; **walking legs of similar shape**, decreasing in size posteriorly, covered with numerous stiff short and longer, more supple, hairs, **but without any spines**. **Colour:** rather uniformly reddish brown or yellowish brown.

**Size:** Maximum carapace length 22 cm, carapace width 18 cm.

**Habitat, biology, and fisheries:** Sublittoral to about 75 m, on rocky bottoms with algae. Coastal waters over the continental shelf. In the larger part of the west african coast it is not enough abundant to form the subject of a fishery, only in Morocco it is said to be "assez abondant sur les marches" (A. Gruvel and W. Benard, 1937, Atlas de poche des principaux produits marins rencontrés sur les marchés du Maroc: 186). Caught with bottom trawls and trammel nets. Marketed fresh.

**Distribution:** East Atlantic: from Morocco to Namibia including islands; northwards extending as far as the North Sea. Neumann (1998) showed that the Atlantic and Mediterranean populations of what was known as *Maja squinado* belong to different species. All Atlantic records of *Maja squinado* must be referred to *M. brachydactyla*, the Mediterranean to *M. squinado*.



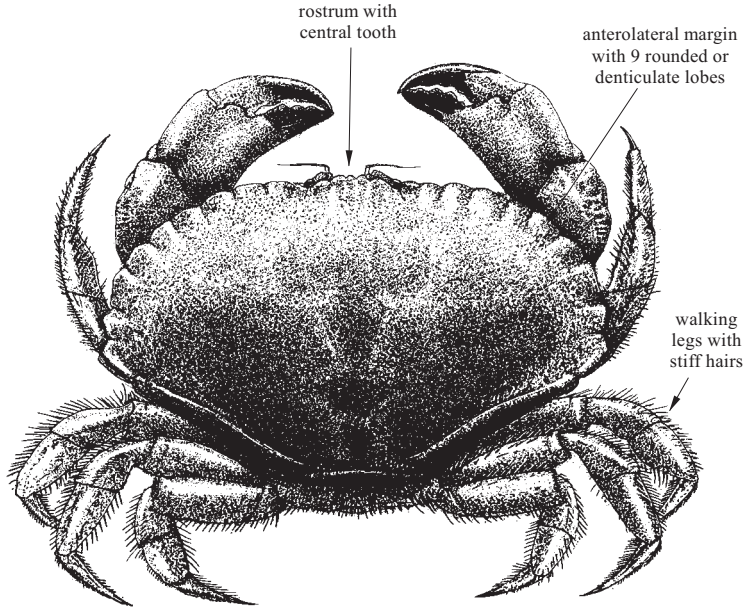
Superfamily CANCROIDEA

CANCRIDAE

Rock crabs

**Diagnostic characters:** Carapace broadly oval or hexagonal; front not produced in form of a rostrum but having a central tooth, narrow compared to maximum carapace width; anterolateral margins toothed (9 low, blunt, rounded or denticulate lobes in species listed here); posterolateral part of carapace not forming a clypeiform expansion over the bases of the legs; margins of carapace not densely setose. Antennal flagellum non setose. Last 4 pairs of legs similar, with stiff hairs.

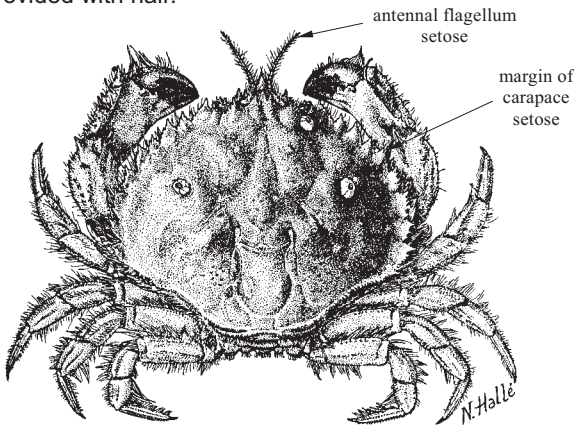
**Habitat, biology, and fisheries:** Living in rocky and sandy areas in shallow water to over 600 m depth. *Cancer pagurus* is of minor commercial interest in the area. It is of commercial interest along the European Atlantic coast.



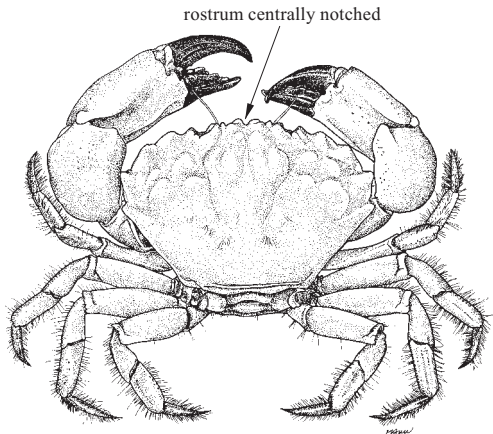
Similar families present in the area

Atelecyliidae (non-commercial): carapace circular to pentagonal, margins densely setose. Frontal region and anterolateral margins with well-developed teeth. Orbit complete. Antennal flagellum setose.

Xanthoidea: carapace transversely oval or transversely hexagonal, front broad and notched centrally, never produced in form of a rostrum; anterolateral margin lobulate or toothed; last 4 pairs of legs similar, provided with hair.

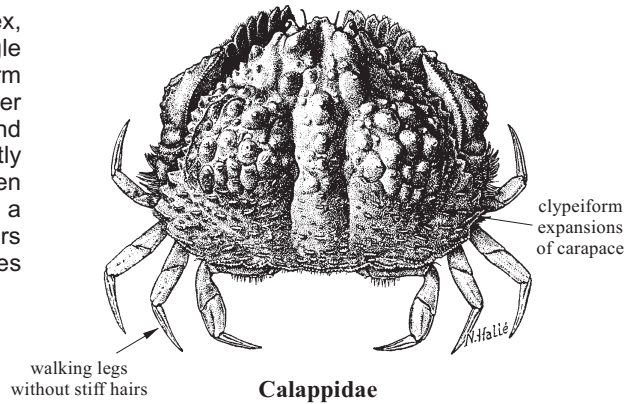


Atelecyliidae



Xanthoidea

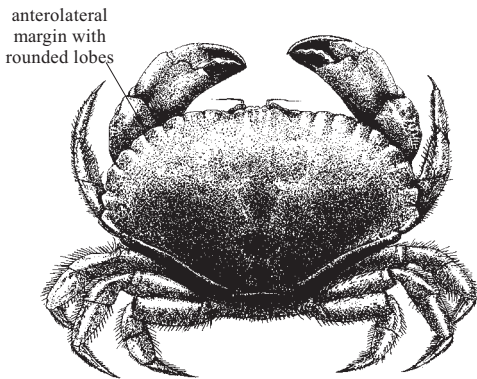
Calappidae: carapace strongly convex, anterior and lateral margins forming a single arc; posterolateral parts forming clypeiform expansions over the legs, ending in broader or narrower teeth; chelipeds large and flattened, in a flexed position fitting exactly against the front of the body, the eyes then just looking over them; palm of chelae with a high dorsal cock's comb-like crest; last 4 pairs of legs similar, smooth; dactyls without spines or hairs.



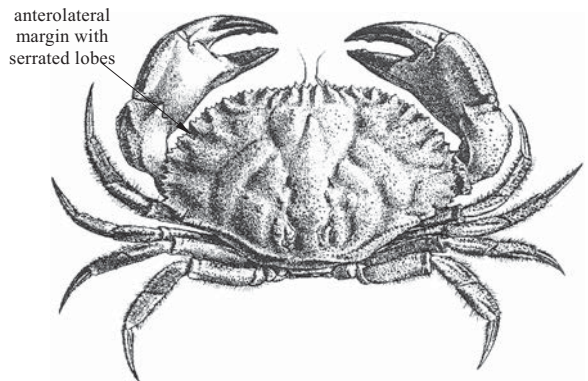
**Calappidae**

**Key to the species of Cancridae present in the area**

- 1a. Anterolateral margins of carapace with rounded lobes (Fig. 1); outer surface of palm of chela without longitudinal rows of granules . . . . . ***Cancer pagurus***
- 1b. Anterolateral margins of carapace with serrated lobes (Fig. 2); outer surface of palm of chela with 7 longitudinal rows of granules . . . . . ***Cancer bellianus***






**Fig. 1 *Cancer pagurus***



**Fig. 2 *Cancer bellianus***

**List of species occurring in the area**

The symbol  is given when species accounts are included

-  *Cancer bellianus* Johnston, 1861.
-  *Cancer pagurus* Linnaeus, 1758.

**References**

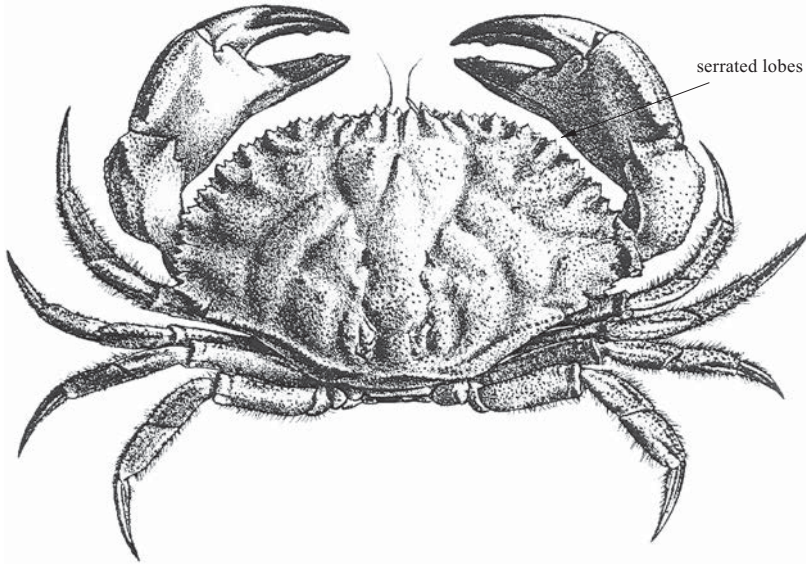
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**Manning R.B. & Holthuis, L.B.** 1981. West African brachyuran crabs (Crustacea: Decapoda). *Smithsonian Contributions to Zoology*, 306: 1–379.

*Cancer bellianus* Johnston, 1861

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

**FAO names:** **En** – Toothed rock crab; **Fr** – Tourteau denté; **Sp** – Jaiba de roca dientuda.



**Diagnostic characters:** Body broadly oval, **rather flat**; surface with the regions separated by **conspicuous grooves**. Front with 5 rather blunt teeth, not produced beyond outline of carapace; anterolateral margin with 9 wide lobes, separated by closed fissures; **truncated tips of lobe each with 3 or more sharp denticles giving it a serrated appearance**. **Chelipeds with distinct, sharp tubercles on palm and carpus, those on outer surface of palm arranged in about 7 longitudinal rows; last 4 pairs of legs similar, with stiff hairs and spinules** (e.g. a row of spinules on upper margin of merus). **Colour:** pale brown mottled with darker brown and red; tips of fingers and of some of the spines black. Hairs rather long and yellowish.

**Size:** Maximum carapace length 13 cm; carapace width to 20 cm.

**Habitat, biology, and fisheries:** Essentially a species from deeper water found at depths between 37 and 620 m. Portuguese and Spanish trawlers catch this species off Portugal and off northwestern Africa as a bycatch with their other catches. Caught mainly with bottom trawls. Marketed mostly fresh; the claws of the crabs are removed and boxed on board and landed at markets in Portugal and Spain; whole crabs are occasionally landed also. Commercially the catches are unimportant.

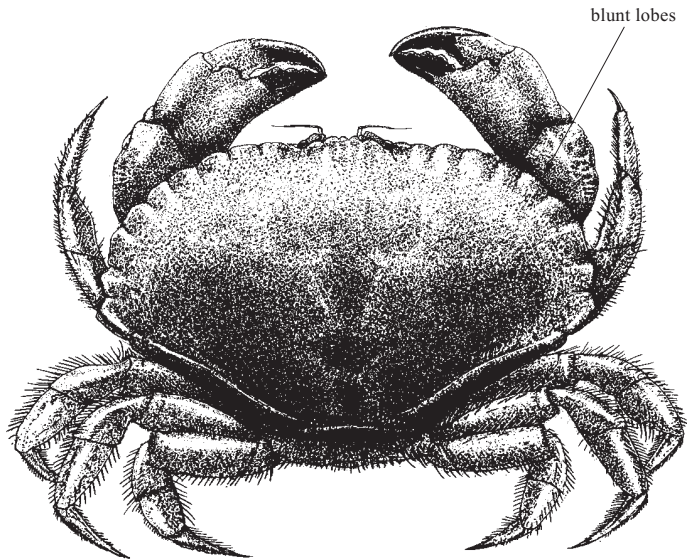
**Distribution:** Eastern Atlantic: Madeira, Canary Islands and the West African coast off Morocco and Sahara (to El Aiun); northwards extending to the Azores and along the Atlantic coast of Europe to southwest Ireland, the Shetland Islands and the southern coast of Iceland.



***Cancer pagurus*** Linnaeus, 1758

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

**FAO names:** **En** – Edible crab; **Fr** – Tourteau; **Sp** – Buey de mar.



**Diagnostic characters:** Body broadly oval, **rather convex, grooves very faint**. Front with 5 blunt teeth, not produced beyond outline of carapace; anterolateral margin with 9 wide, **blunt lobes with rounded tops**, separated by closed fissures. **Pincers large and smooth, without spinules; last 4 pairs of legs similar**, roughened by numerous groups of very short stiff black hairs, but **without true spines or spinules**. **Colour:** pale reddish brown, at places more yellowish brown, juveniles more purplish; colour more or less uniform, without a special pattern; tips of fingers of chelae black.

**Size:** Maximum carapace length 20 cm; maximum carapace width 30 cm. Usually the carapace width does not surpass 24 cm.

**Habitat, biology, and fisheries:** Found on rocky or sandy bottom between intertidal area and 100 m depth, usually between 6 and 40 m depth. No special fishery within the area. Of commercial value in Scandinavian and British waters, to a lesser degree off the Atlantic coasts of Spain and Portugal. Caught usually with traps (in Europe); also as bycatch in trawl fisheries. Sold fresh in Morocco, but according to A. Gruvel and W. Besnard (1937, Atlas de poche des principaux produits marins rencontrés air les marchés du Maroc: 183) the species is extremely rare there.

**Distribution:** Eastern Atlantic: off northern Morocco; northwards extending along the Atlantic coast of Europe, to the British Isles and northern Norway (about 70°N); several, but mostly old, records from the north coast of the Mediterranean.

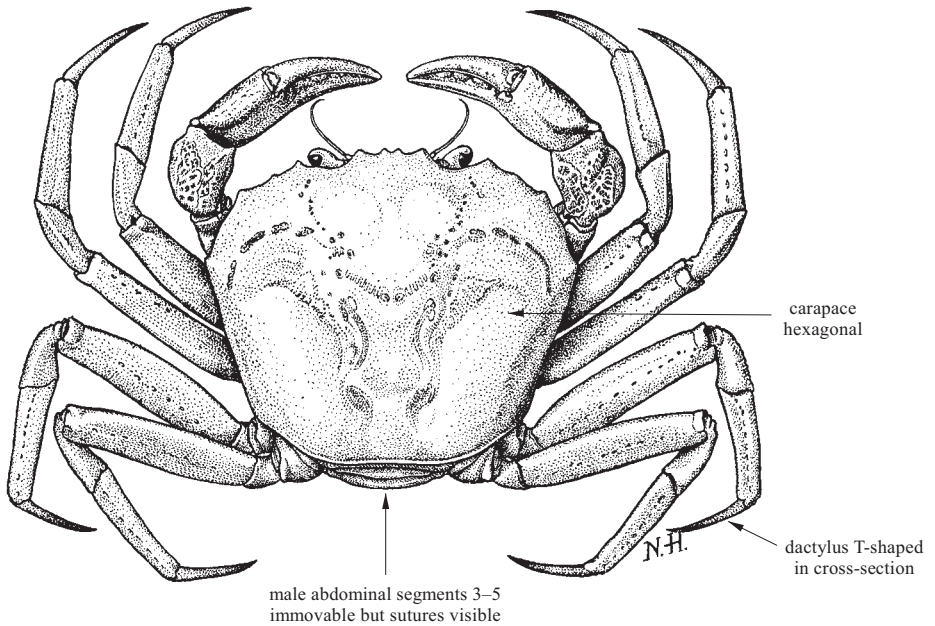


**Superfamily PORTUNOIDEA**

**GERYONIDAE**

**Deep-sea crabs, geryons**

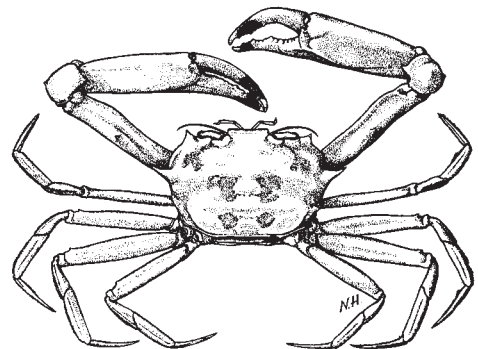
**D** **Diagnostic characters:** Carapace flat, smooth or granular, hexagonal, about as long as wide; front broad, not produced, but with 4 teeth; anterolateral margin with 3 or 5 indistinct shallow teeth. Last 4 pairs of legs long, slender, similar, smooth; **dactylus T-shaped in cross-section**. **Male abdominal segments 3 to 5 fused**, functionally immovable, but sutures still visible.



**Habitat, biology, and fisheries:** These are deep-sea crabs, normally occurring in depths below 100 m. Taken by trawls and traps. Several species are of commercial interest. The most widely exploited species in the area is *Chaceon maritae*.

**Similar families occurring in the area**

Members of the family can only be confused with some members of the Goneplacidae, which also have a squarish carapace. However, geryons are usually of larger size, have relatively long legs and the characteristic T-shaped dactyls of the walking legs in cross-section.



**Goneplacidae**

**Key to the species of Geryonidae occurring in the area**

- 1a. Anterolateral part of carapace with 3 teeth on each side; frontal teeth poorly developed (Fig. 1) . . . . . ***Geryon trispinosus***
- 1b. Anterolateral part of carapace with 5 teeth on each side; frontal teeth well-developed (Fig. 2) . . . . . → 2

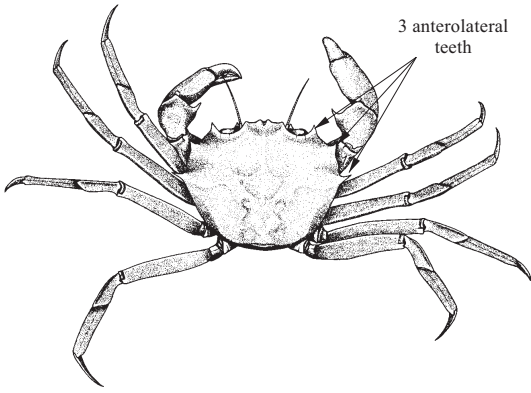


Fig. 1 *Geryon trispinosus*

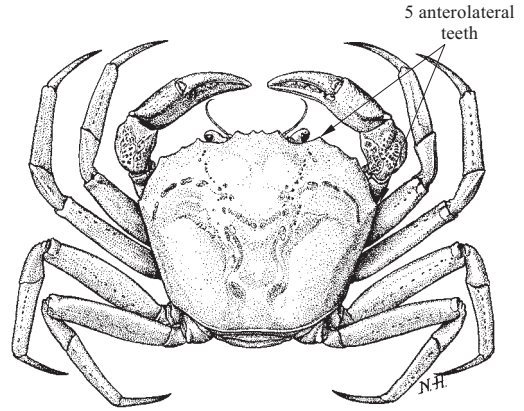


Fig. 2 *Chaceon maritae*

- 2a. Dactylus of fifth leg laterally compressed (Fig. 3a) . . . . . → 3
- 2b. Dactylus of fifth leg dorsoventrally depressed (Fig. 3b) . . . ***Chaceon maritae***
- 3a. Merus of fifth leg with large, well-developed distal spine (Fig. 4a). . → 4
- 3b. Merus of fifth leg without distal spine (Fig. 4b) . . . . . → 7

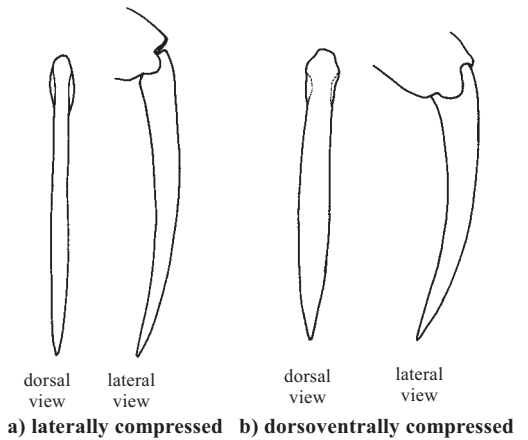


Fig. 3 dactylus fifth leg

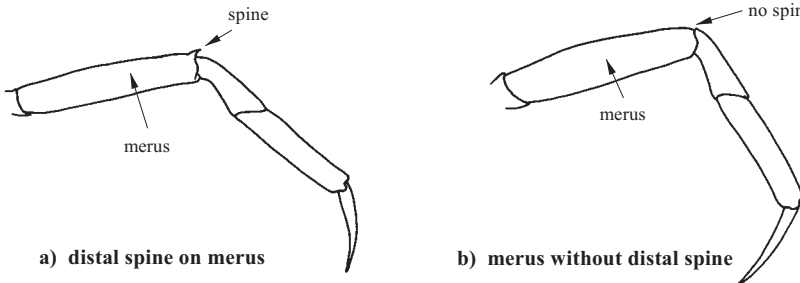
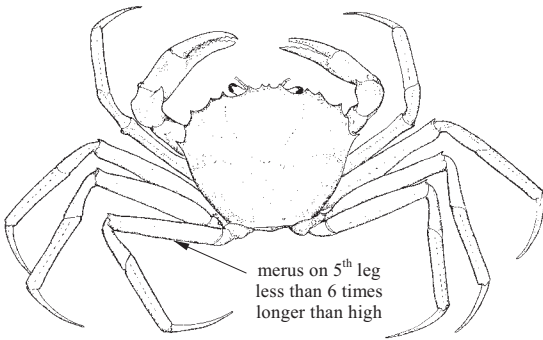


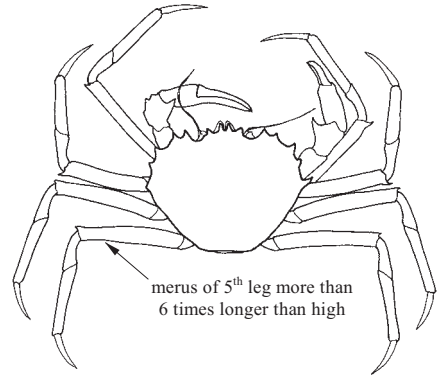
Fig. 4 fifth leg

- 4a. Anterolateral teeth on carapace large, well developed in adults . . . . . → 5
- 4b. Anterolateral teeth on carapace small, reduced . . . . . → 6

- 5a. Merus of fifth leg less than 6 times longer than high; occurs in depths less than 250 m (Fig. 5) . . . . . ***Chaceon gordonae***
- 5b. Merus of fifth leg more than 6 times longer than high; occurs in depths in excess of 2 000 m (Fig. 6) . . . . . ***Chaceon atopus***

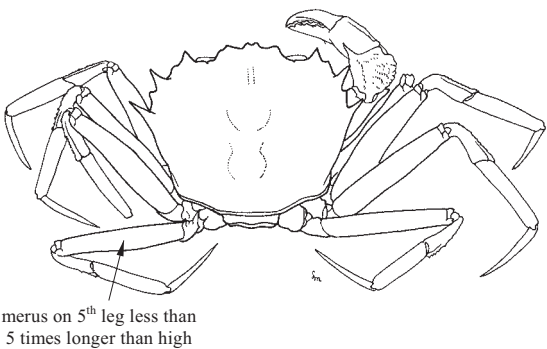


**Fig. 5** *Chaceon gordonae*

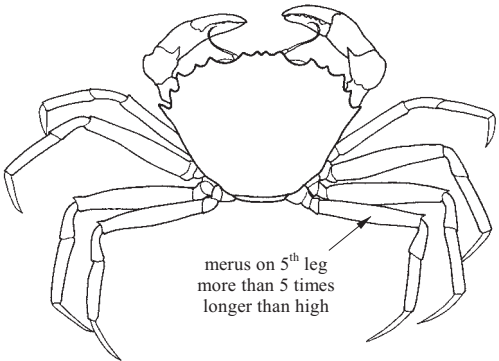


**Fig. 6** *Chaceon atopus*

- 6a. Merus of fifth leg less than 5 times longer than high (Fig. 7) . . . . . ***Chaceon chuni***
- 6b. Merus of fifth leg more than 5 times longer than high (Fig. 8) . . . . . ***Chaceon erytheiae***

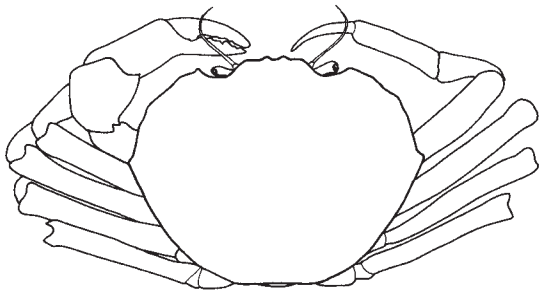


**Fig. 7** *Chaceon chuni*

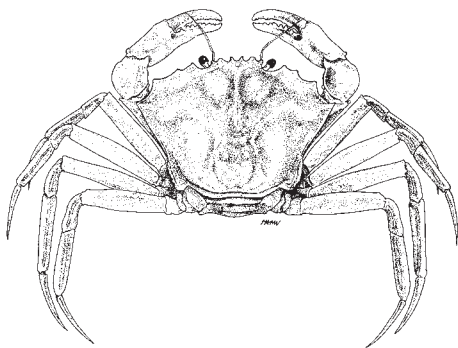


**Fig. 8** *Chaceon erytheiae*

- 7a. Frontal and anterolateral teeth on carapace very low and blunt; second and fourth anterolateral teeth almost completely obsolete (Fig. 9) . . . . . ***Chaceon sanctaehelenae***
- 7b. Frontal and anterolateral teeth on carapace moderately low and blunt; second and fourth anterolateral teeth developed (Fig. 10) . . . . . ***Chaceon affinis***




**Fig. 9** *Chaceon sanctaehelenae*



**Fig. 10** *Chaceon affinis*



**List of species occurring in the area**

The symbol  is given when species accounts are included

-  *Chaceon affinis* (A. Milne Edwards and Bouvier, 1894).
- Chaceon atopus* Manning and Holthuis, 1989 [St. Helena].
- Chaceon chuni* (Macpherson, 1983) [Namibia and South Africa].
- Chaceon erytheiae* (Macpherson, 1984) [Valdivia Bank, SE Atlantic].
- Chaceon gordonae* (Ingle, 1985) [Sierra Leone, São Tomé Island].
-  *Chaceon maritae* (Manning and Holthuis, 1981).
- Chaceon sanctaehelenae* Manning and Holthuis, 1989 [St. Helena, São Tomé Island].
-  *Geryon trispinosus* (Herbst, 1803).

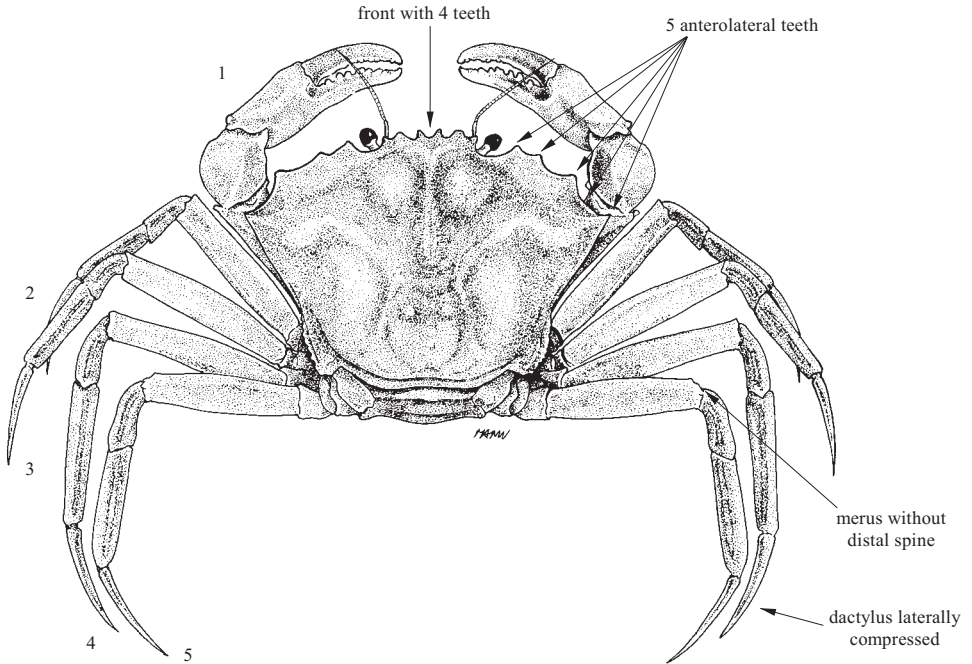
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***Chaceon affinis*** (A. Milne Edwards and Bouvier, 1894)

**Frequent synonyms / misidentifications:** None / *Geryon quinquedens* sensu Bouvier, 1922; Monod, 1956 (in part) (non S.I. Smith, 1879).

**FAO names:** **En** – Deep-sea red crab; **Fr** – Crabe rouge de profondeur; **Sp** – Cangrejo rey.



**Diagnostic characters:** A large deep-sea crab; body hexagonal, widest anteriorly, its surface uneven but rather smooth. Four frontal teeth well developed, inner teeth slightly more developed than outer teeth, rather acute. **Five anterolateral teeth on carapace moderately low and blunt; second and fourth teeth smaller than others.** Chelipeds equal in shape and size; last 4 pairs of legs equal or almost so, smooth, without hairs or spines; **meri of fifth legs without distal spine; dactyli of fifth legs laterally compressed.** **Colour:** dirty brownish or yellowish, or a rather uniform colouring without distinct pattern.

**Size:** Maximum carapace width 21 cm.

**Habitat, biology, and fisheries:** Occurring in depths between 130 and 2 047 m on muddy, sandy and hard bottoms. Not yet commercially fished in the area. Local fisheries on the species in northwestern Spain. Experimental fisheries around the Canary Islands showed large numbers of crabs in various types of traps caught at depths between 550 and 1 200 m. There is growing interest in the possible fishery for this crab.

**Distribution:** East Atlantic: Madeira, Canary Islands and Cape Verde Islands, along the Atlantic coast of Europe as far north as southwestern Norway.

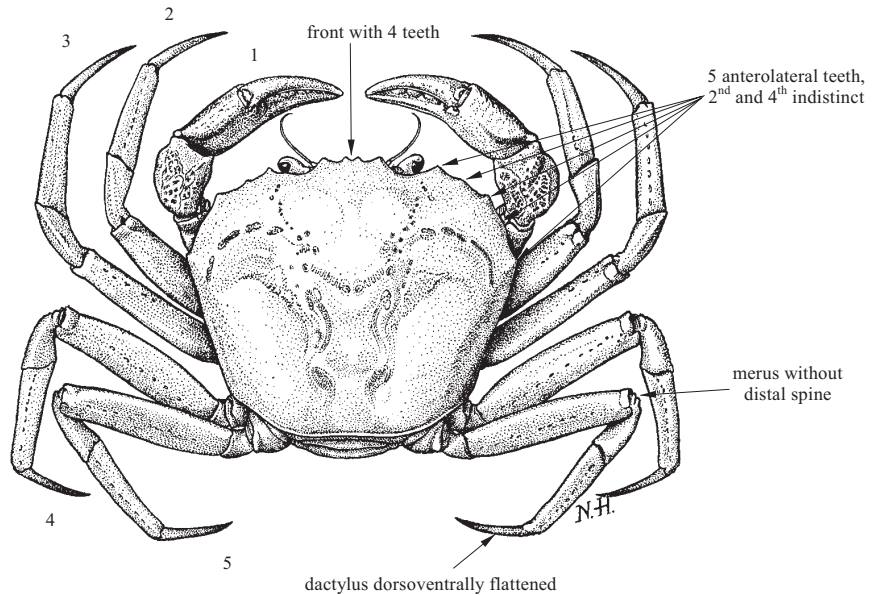
**Remark:** Genetic studies show that the populations of the northwestern Atlantic commercially important *Chaceon quinquedens* and the northeastern Atlantic populations of *Chaceon affinis* are very similar.



***Chaceon maritae*** (Manning and Holthuis, 1981)

**Frequent synonyms / misidentifications:** None / *Geryon quinquedens* sensu Monod, 1956 (non S.I. Smith, 1879)

**FAO names:** En – West African geryon; Fr – Géryon ouest-africain; Sp – Gerión de Guinea.



**Diagnostic characters:** A large deep-sea crab; body hexagonal, widest anteriorly, its surface uneven but rather smooth, with grooves. Front with 4 short and broad teeth, no median tooth; anterolateral margin with 5 blunt, wide, obscure teeth (outer angle of orbit included), **of which the second and fourth are particularly indistinct**. Chelipeds slightly unequal in shape and size; last 4 pairs of legs equal or almost so, smooth, without hairs or spines; **meri without distal spine; dactyls dorsoventrally flattened**. **Colour:** dirty brownish or yellowish, or a rather uniform colouring without distinct pattern.

**Size:** Carapace of males to 14 cm long and 16 cm wide, in the females these measurements are 8.9 and 9.5 cm respectively.

**Habitat, biology, and fisheries:** Inhabits muddy bottoms between 100 and 936 m depth; most frequent between 300 and 700 m. Commercially fished off the coast of Angola and Namibia. Exploratory fishing off the Côte d'Ivoire and possibly other areas. Taken by trawlers, but in areas where the bottom is rough, exploratory fishing with traps met with reasonable success. Marketed fresh, but Spanish trawlers that catch the species as a bycatch to shrimps sell only the chelipeds.

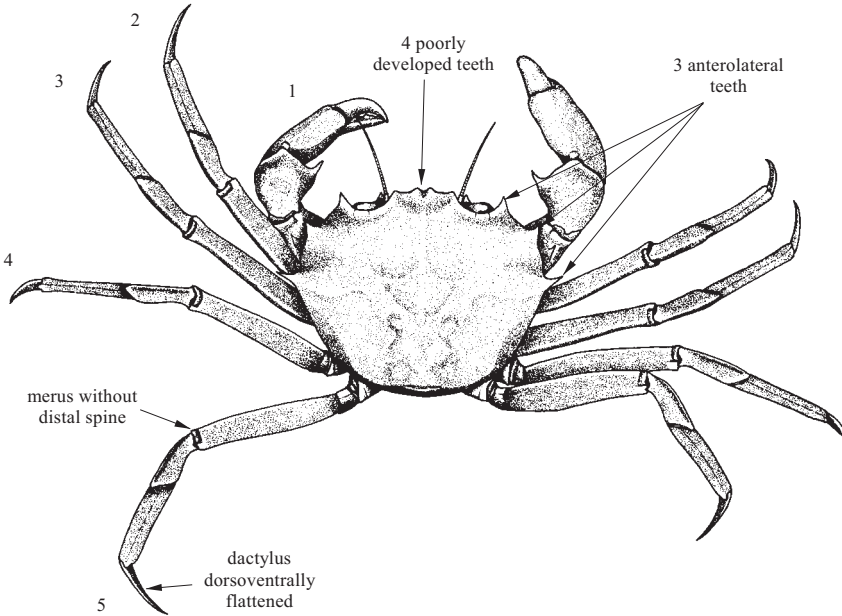
**Distribution:** East Atlantic: Western Sahara and Canary Islands to Southwest Africa.



***Geryon trispinosus* (Herbst, 1803)**

**Frequent synonyms / misidentifications:** *Geryon tridens* Krøyer, 1837 / None.

**FAO names:** **En** – Three-spined geryon; **Fr** – Géryon à trois épines; **Sp** – Gérion de tres espinas.



**Diagnostic characters:** A large deep-sea crab; body hexagonal, widest anteriorly, its surface uneven but rather smooth. **Front with 4 poorly developed teeth**, 2 median teeth extending little beyond outer 2 teeth, no median tooth; **anterolateral margin with 3 acute teeth**, the lateralmost being strongest. Chelipeds slightly unequal in shape and size; last 4 pairs of legs equal or almost so, smooth, without hairs or spines; **meri of fifth legs without distal spine**; **dactyls dorsoventrally flattened**. **Colour:** red to brick-red.

**Size:** maximum carapace length 8 cm, breadth 10 cm.

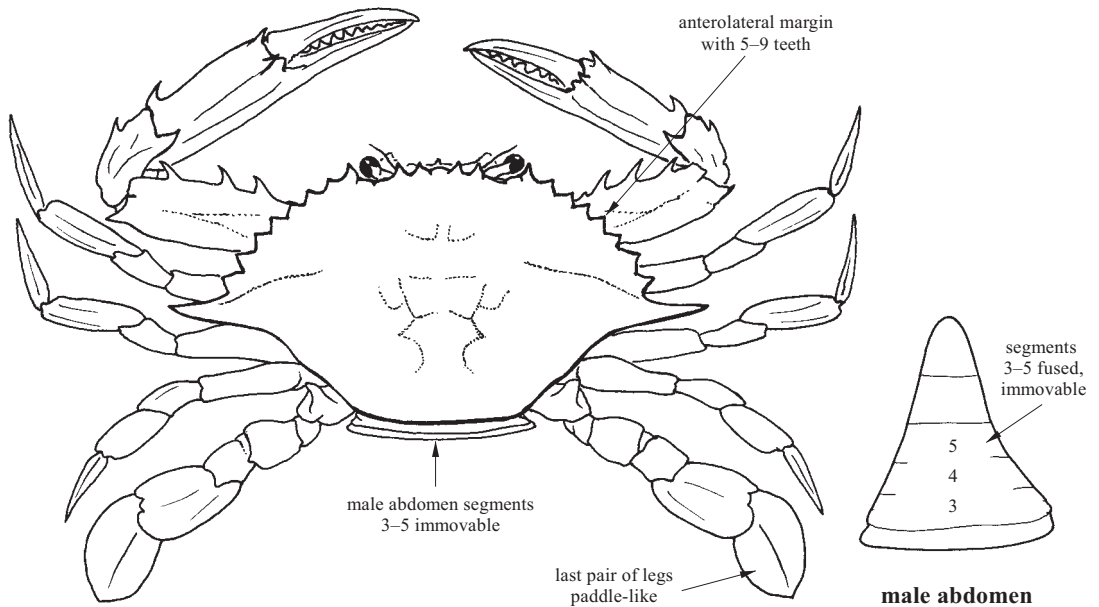
**Habitat, biology, and fisheries:** Recorded from soft bottoms between 32 and 690 m, most commonly deeper than 100 m.

**Distribution:** East Atlantic: Morocco and Canary Islands, along the Atlantic coasts of Europe up to Norway. The species is very similar to the Mediterranean *Geryon longipes* A. Milne Edwards, 1882.



**PORTUNIDAE****Swimming crabs**

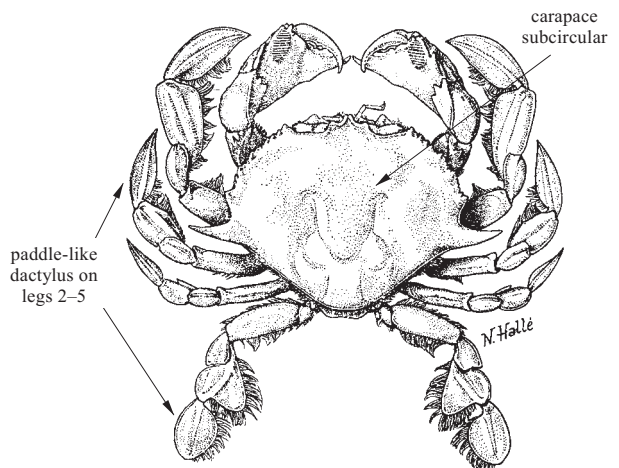
**Diagnostic characters:** Carapace hexagonal, transversely ovate to transversely hexagonal, sometimes almost circular; dorsal surface generally relatively flat, often ridged or granulose; front broad, margin usually multidentate; **5 to 9 teeth on each anterolateral margin**; posterolateral margins usually distinctly converging. **Last pair of legs with distal 2 segments wider and more flattened than these segments of previous legs, in most species the dactylus is oval and paddle-shaped**, adapted for swimming purposes, none of the dactyli with conspicuous spines. Male abdominal segments 3 to 5 completely fused, immovable.



**Habitat, biology, and fisheries:** Benthic to semipelagic crabs with diverse habits. Many species of commercial importance.

**Similar families occurring in the area**

**Matutidae or Moon crabs:** this is the only family in the area that has paddle-like legs. In the Matutidae at least the last 3 pairs of legs are paddle-like while in the Portunidae only the last pair. The carapace is subcircular.

**Matutidae**

**Key to the species of Portunidae occurring in the area**

1a. Frontal margin of carapace with irregular incisions and with teeth of various sizes (Fig. 1a); body with velvety pubescence (Fig. 1b); eyes characteristically red in live specimens . . . . . ***Necora puber***

1b. Frontal margin of carapace without teeth or with 3 to 6 distinct teeth . . . . → 2

2a. Frontal margin of carapace without median incision, triangular or straight, without teeth (Fig. 2a, e), or with 3 teeth (Fig. 2b, f) . . . . . → 3

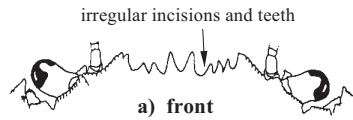
2b. Frontal margin of carapace often with median incision, without teeth (Fig. 2c) or with an even number of teeth (Fig. 2d) . . . . . → 19

3a. Frontal margin of carapace triangular or trilobate (Fig. 2a, b) . . . . → 4

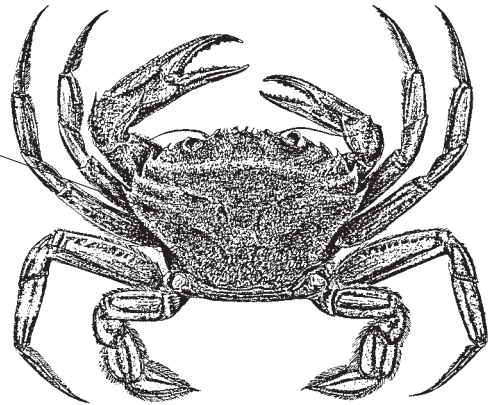
3b. Frontal margin of carapace straight or with 3 teeth (Fig. 2e, f) . . . . . → 7

4a. Frontal margin of carapace triangular, projected forward (Fig. 2a); chelipeds armed with ridges on carpus and lateral surface of palm . . . . . → 5

4b. Frontal margin of carapace trilobate, not projecting forward (Fig. 2b); chelipeds without ridges on carpus and lateral surface of palm . . . . . → 6



velvety pubescence



**Fig. 1 *Necora puber***



a) *Xaiva biguttata*



b) *Caracinus maenas*



c) *Thalamita poissonii*



d) *Bathynectes piperitus*



e) *Liocarcinus arcuatus*



f) *Polybius henslowii*

**Fig. 2 frontal margin of carapace**

- 5a. Carapace slightly broader than long, granulose, with small ridges and transversal lines of granules; front with 2 undulations on both sides; small tooth present between 2 supraorbital fissures (Fig. 3a); palm with 3 ridges on outer surface; no difference between dactylus of fourth and fifth leg, both not paddle-like (Fig. 3b). . . . . ***Xaiva biguttata***
- 5b. Carapace as long as broad, smooth; front with 1 undulation on both sides; no small tooth between supraorbital fissures (Fig. 4a); palm with 1 ridge on outer surface; dactylus of fifth leg broader and more flattened than that of fourth leg, paddle-like (Fig. 4b). . . . . ***Xaiva mcleayi***

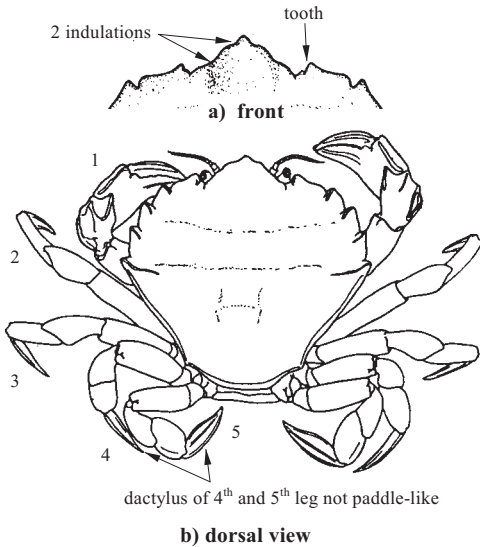


Fig. 3 *Xaiva biguttata*

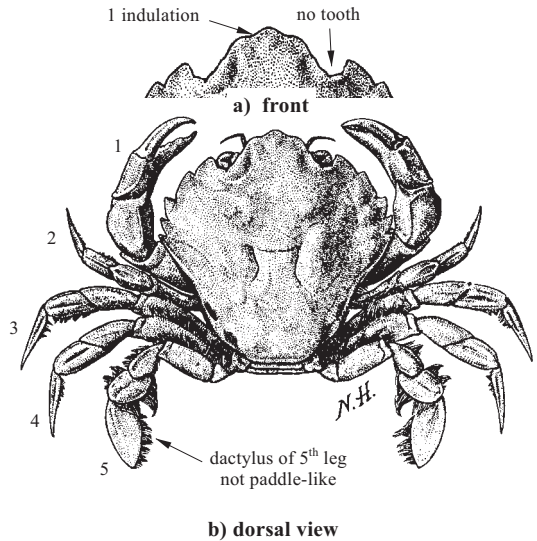


Fig. 4 *Xaiva mcleayi*

- 6a. Gonopods strongly recurved (Fig. 5a); carapace distinctly granulose, slightly pubescent; anterolateral teeth acutely pointed . . . . . ***Carcinus maenas***
- 6b. Gonopods straight (Fig. 5b), carapace faintly granulose, pubescent in distinct regions; anterolateral teeth bluntly pointed . . . . . ***Carcinus aestuarii***  
[Mediterranean and Canary Islands]

- 7a. Carapace subcircular, anterolateral teeth small; dactyli of second to fourth legs flattened, however not paddle-like as in fifth (Fig. 6) . . . . . ***Polybius henslowii***  
[North Sea to Morocco, Mediterranean; pelagic]
- 7b. Carapace hexagonal, anterolateral teeth well developed; dactyli of second to fourth legs styliform (Fig. 8). . . . . → 8

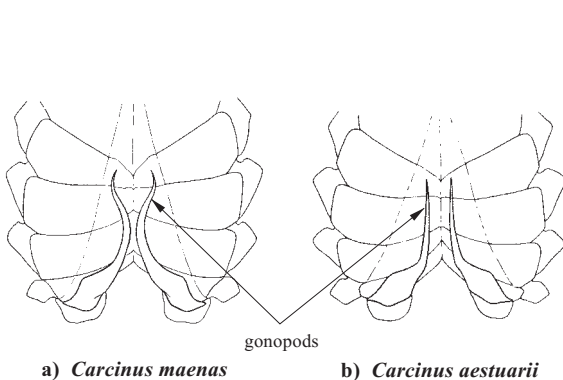


Fig. 5 thoracic sternum after removal of abdomen

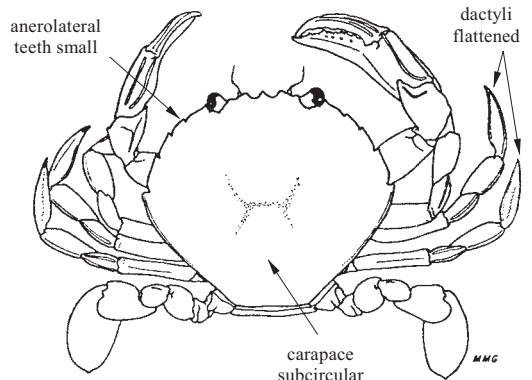


Fig. 6 *Polybius henslowii*

- 8a. Last anterolateral tooth on carapace larger than others, directed laterally; carapace covered with tubercles . . . . . → **9**
- 8b. All anterolateral teeth on carapace of same size . . . . . → **11**
  
- 9a. Fifth anterolateral tooth of carapaces slightly larger than preceding 4; frontal margin with median tooth acute, not exceeding outward directed submedian teeth (Figs 7c and 8) . . . . . ***Macropipus rugosus***  
[Mauritania to Angola]
- 9b. Fifth anterolateral tooth of carapace 1.5 to 2 times as large as preceding 4; frontal margin with median tooth blunt, exceeding forward directed submedian teeth (Fig. 7a, b) . . . . . → **10**

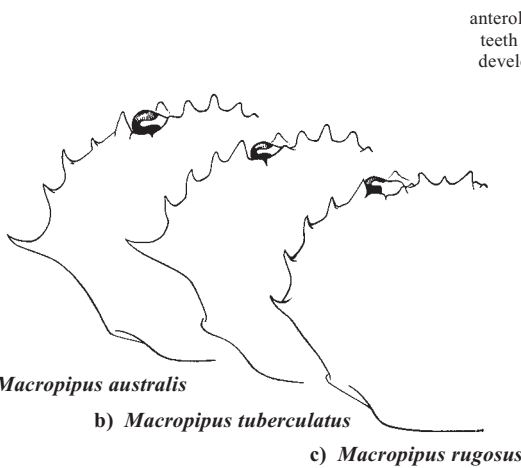


Fig. 7 carapace

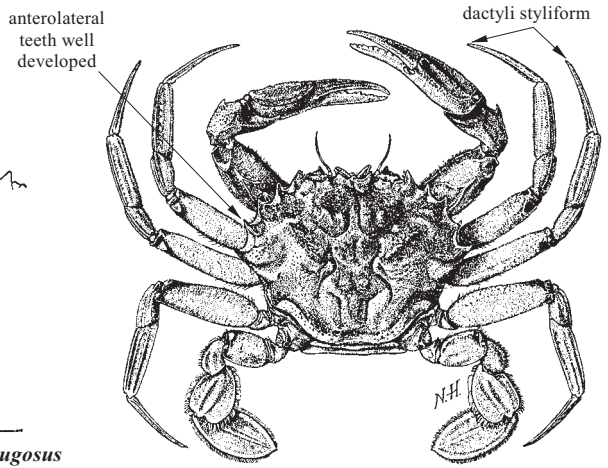


Fig. 8 *Macropipus rugosus*

- 10a. Second anterolateral tooth of carapace smaller than third and fourth teeth (Figs 7a and 9) . . . . . ***Macropipus australis***  
[Angola and SW Africa]
- 10b. Second to fourth anterolateral teeth of carapace equal in size (Figs 7b and 10) . . . . . ***Macropipus tuberculatus***  
[Norway to Morocco, Azores]

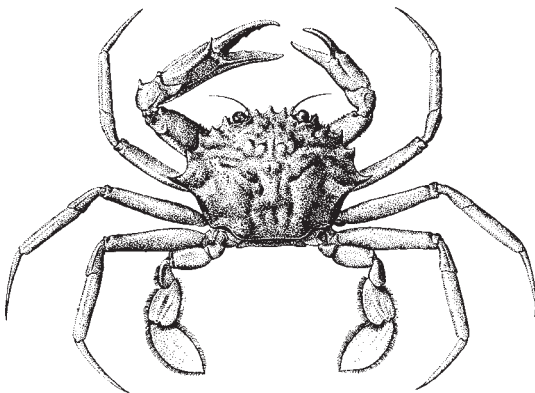


Fig. 9 *Macropipus australis*

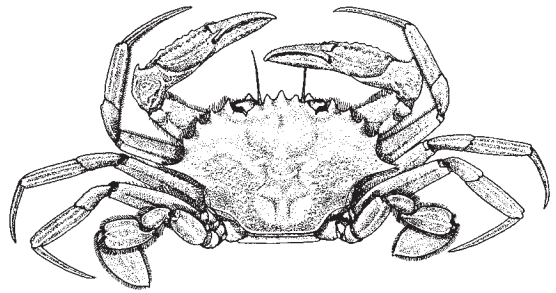
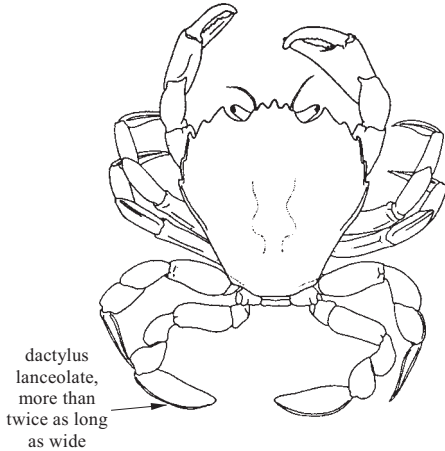


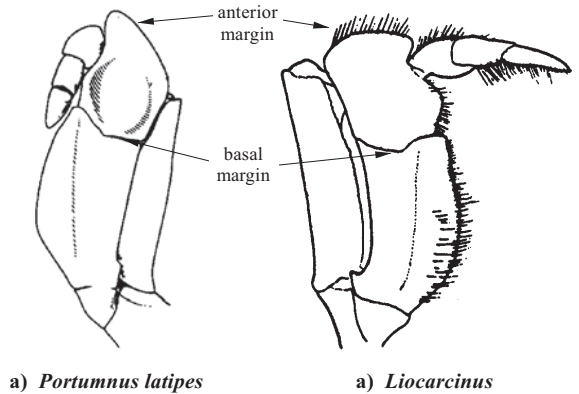
Fig. 10 *Macropipus tuberculatus*



- 11a.** Carapace about as long as broad; dactylus of fifth legs lanceolate, more than twice as long as wide (Fig. 11); anterior margin of merus or third maxilliped oblique, forming an angle with its basal margin (Fig. 12a) . . . . . *Portunus latipes*  
 [North Sea to Morocco, Azores, Canary islands]
- 11b.** Carapace distinctly broader than long; dactylus of fifth legs oval, less than twice as long as wide; anterior margin of merus of third maxilliped straight, parallel with its basal margin (Fig. 12b) . . . . . (*Liocarcinus*) → 12

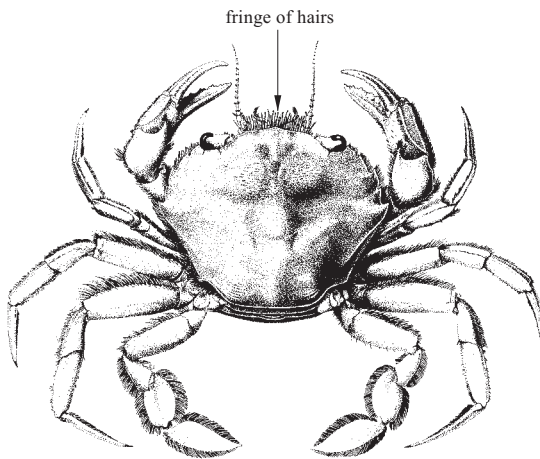


**Fig. 11** *Portunus latipes*

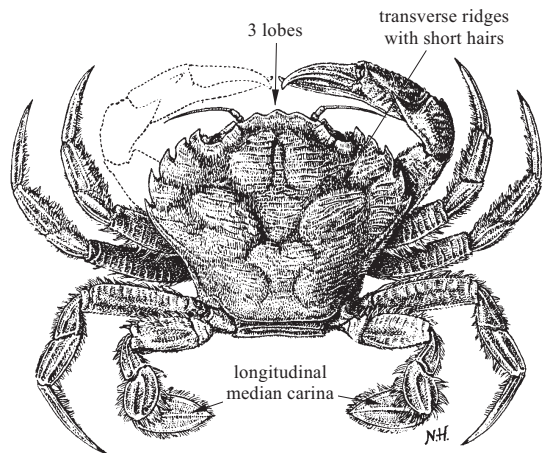


**Fig. 12** third maxilliped

- 12a.** Frontal margin of carapace straight or slightly convex, without teeth or lobes, with distinct fringe of hairs (Fig. 13) . . . . . *Liocarcinus navigator*  
 [North Sea to Mauritania, Mediterranean]
- 12b.** Frontal margin of carapace with 3 teeth or lobes, without fringe of hairs (Fig. 14) . . . . . → 13
- 13a.** Dactylus of fifth leg with longitudinal median carina (Fig. 14) . . . . . *Liocarcinus corrugatus*
- 13b.** Dactylus of fifth leg without longitudinal median carina (Figs 15 to 18) . . . . . → 14



**Fig. 13** *Liocarcinus navigator*



**Fig. 14** *Liocarcinus corrugatus*

- 14a.** Frontal margin of carapace with 3 blunt lobes, distinctly extending beyond eyes; maximum carapace breadth 2.5 cm (Figs 15 and 16) . . . . . → 15
- 14b.** Frontal margin of carapace with 3 acute teeth, not distinctly extending beyond eyes; maximum carapace breadth 5 cm (Figs 17 and 18) . . . . . → 16

**15a.** Cardinal region of carapace strongly elevated; fifth anterolateral tooth of carapace acute, strongly curved; third and fourth leg with carpus shorter than propodus (Fig. 15)  
 ..... *Liocarcinus pusillus*  
**[Norway to Mauritania, possibly Azores and Canary Islands]**

**15b.** Cardinal region of carapace not elevated; fifth anterolateral tooth of carapace blunt, not strongly curved; third and fourth leg with carpus longer than propodus (Fig. 16)  
 ..... *Liocarcinus zariquieyi*  
**[Canary Islands, Mediterranean]**

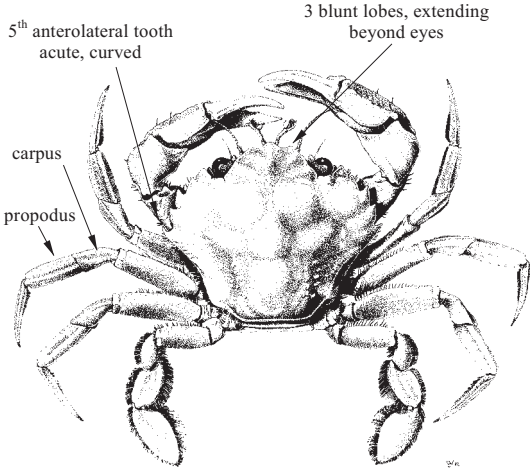


Fig. 15 *Liocarcinus pusillus*

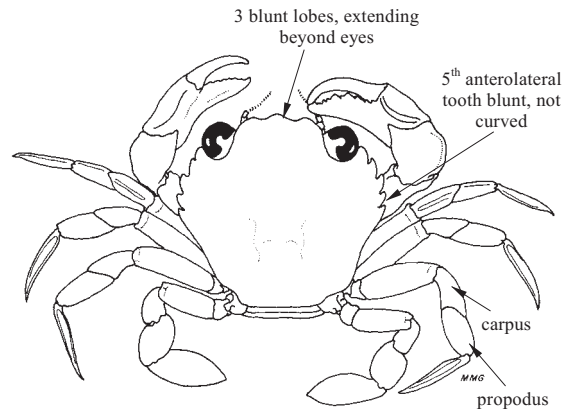


Fig. 16 *Liocarcinus zariquieyi*

**16a.** Distal part of dactylus of fifth legs in living animals dark violet; carapace granulate in anterior part, with tubercles in posterior part, with many velvety pubescent transverse ridges (Fig. 17) ..... *Liocarcinus depurator*  
**[Norway to Western Sahara, Mediterranean]**

**16b.** Distal part of dactylus of fifth legs without coloration; carapace smooth, with few crenulated ridges in gastric region ..... → 17

**17a.** Lateral margin or carpus of chelipeds unarmed (Fig. 19c); carapace with dark red marbled pattern in living animals (Fig. 18) ..... *Liocarcinus marmoreus*  
**[Southern North Sea to Spain, Azores Madeira]**

**17b.** Lateral margin or carpus of celiped with tooth or knob; carapace grey to green sometimes marbled in those colours ..... → 18

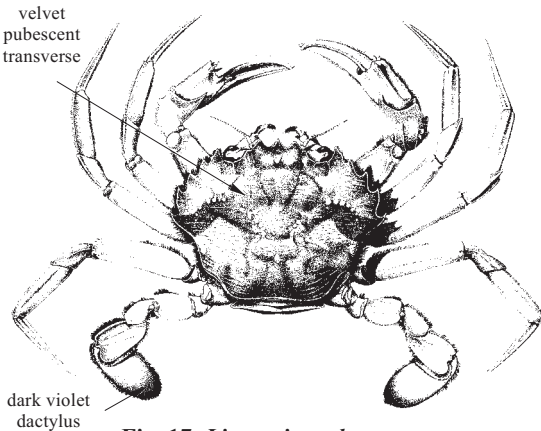


Fig. 17 *Liocarcinus depurator*

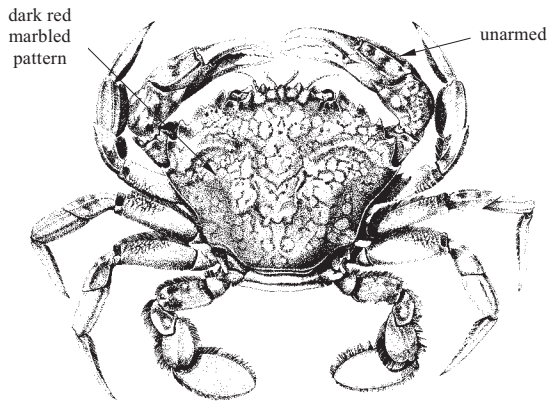
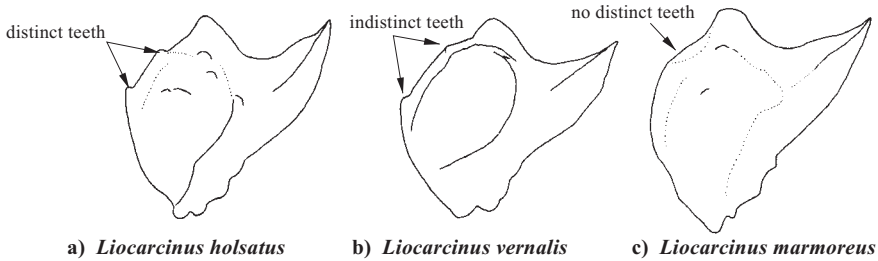


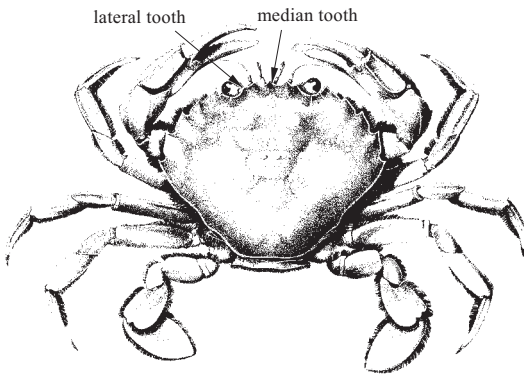
Fig. 18 *Liocarcinus marmoreus*

**18a.** Lateral margin of carpus of cheliped with distinct tooth or knob (Fig. 19a); front with median tooth extending beyond lateral teeth (Fig. 20); carapace smooth, without crenulated ridges . . . . . *Liocarcinus holsatus*  
**[Hebrides to Portugal, Canary Islands, possibly Morocco and Mauritania]**

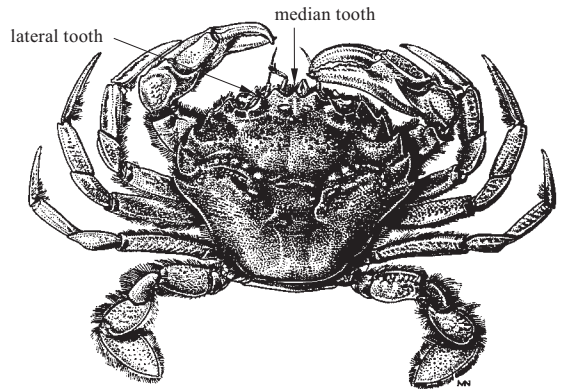
**18b.** Lateral margin of carpus of cheliped with indistinct tooth or knob (Fig. 19b); front with median tooth not extending beyond lateral teeth (Fig. 21); branchial regions of carapace and bases of anterolateral teeth with crenulated ridges . . . . . *Liocarcinus vernalis*  
**[Ireland to Mauritania, Canary Islands, Mediterranean]**



**Fig. 19** carpus of cheliped



**Fig. 20** *Liocarcinus holsatus*



**Fig. 21** *Liocarcinus vernalis*

**19a.** Nine anterolateral teeth on each side of carapace, including the outer orbital tooth . . . . . → **20**

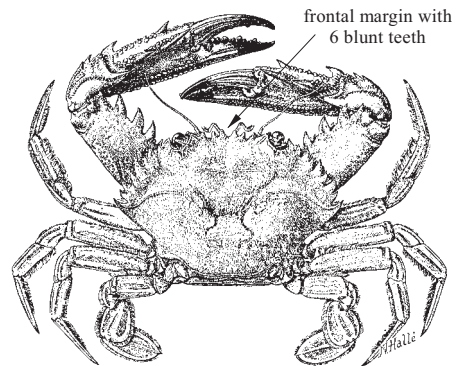
**19b.** Five or 6 anterolateral teeth on each side of carapace, including the outer orbital tooth . . . . . → **29**

**20a.** Frontal margin of carapace with 2 broad rounded teeth (inner orbital angle excluded); carpus of chelipeds with at most 1 tooth on lateral surface; medial angle of carpus rounded. . . . . (*Callinectes*) → **22**

**20b.** Frontal margin of carapace with 4 or 6 teeth (inner orbital angle excluded); carpus of chelipeds with 2 strong acute teeth, 1 on the medial angle the other 1 on the laterodistal margin . . . . . → **21**

**21a.** Frontal margin of carapace with 4 teeth (inner orbital angle excluded), median pair sometimes very small. . . . . → **24**

**21b.** Frontal margin of carapace with 6 blunt teeth (inner orbital angle excluded) (Fig. 22) . . . . . *Cronius ruber*



**Fig. 22** *Cronius ruber*

**22a.** Granules of carapace anterior to epibranchial ridges larger and placed wider apart than those posterior to ridges; epibranchial ridges without distinct inflection in middle, almost straight; submedian pair of frontal teeth well developed, usually half or more than half as long as lateral pair (measuring from base of lateral notch between teeth) (Fig. 23a); first abdominal somite laterally ending in triangular, rather blunt point, not sharply pointed nor curved upward; tips of male gonopods reaching beyond suture between thoracic sternite VI and mesially expanded sternite VII (Fig. 24a) . ***Callinectes amnicola***

**22b.** Granulation of carapace not different anterior and posterior to epibranchial ridges; epibranchial ridges sinuous or distinctly inflected; frontal teeth decidedly unequal in size, submedian pair no more than half as long as lateral pair; tips of male gonopods falling well short of suture between thoracic sternit VI and mesially expanded sternite VII . . . . . → **23**

**23a.** Carapace coarsely granulated; epibranchial ridges with a distinct inflection in the middle (Fig. 23b); first abdominal somite ending laterally in a triangular point, which is neither sharply drawn out nor curved up; male gonopods well separated from each other, not touching or crossed (Fig. 24b) . . . . . ***Callinectes marginatus***

**23b.** Carapace finely granulated; epibranchial ridges not inflected in the middle, at most sinuous (Fig. 23c); first abdominal segment ending laterally in narrow upturned points; male gonopods overlapping each other, often crossed (Fig. 24c) . . . . . ***Callinectes pallidus***

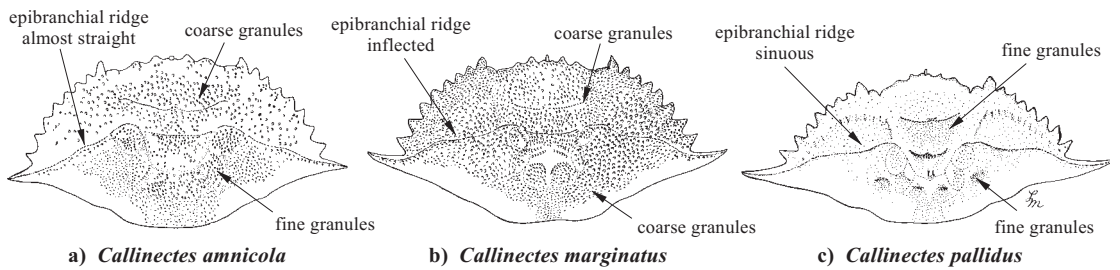


Fig. 23 carapace

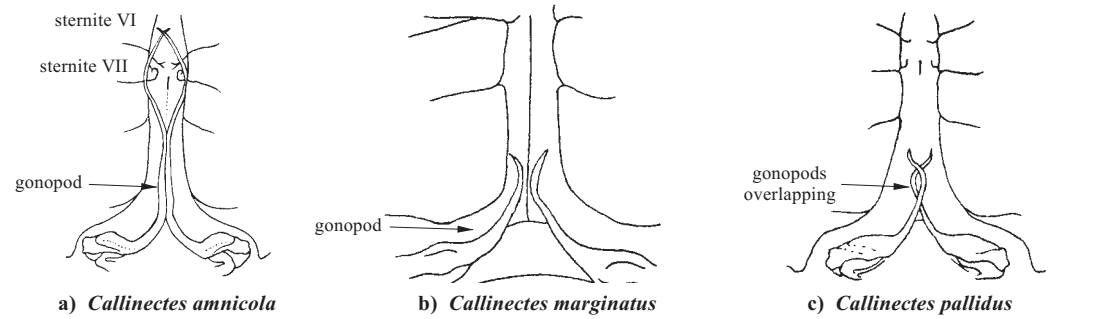
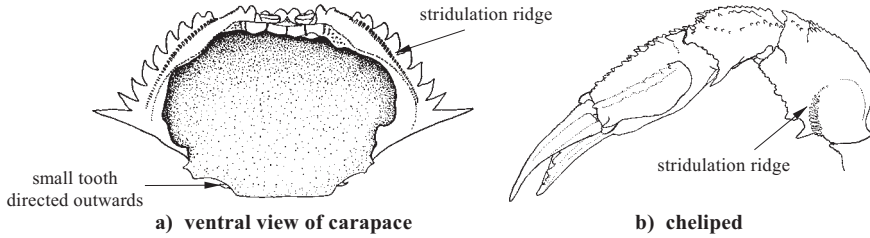


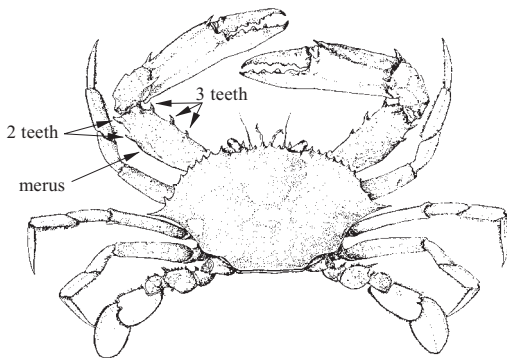
Fig. 24 gonopods

- 24a.** With stridulation ridge on pterygosomial region of carapace (Fig. 25a) and on posteromedian surface of merus of cheliped (Fig. 25b); posterior angles of carapace armed with a small tooth directed out- and upwards . . . . . ***Laleonectes vocans***  
**[Madeira, Cape Verde Islands, São Tomé and Annobon, Ascension]**
- 24b.** Without stridulation ridges on pterygostomial region of carapace nor on merus of cheliped; posterior angles of carapace without a tooth . . . . . → **25**

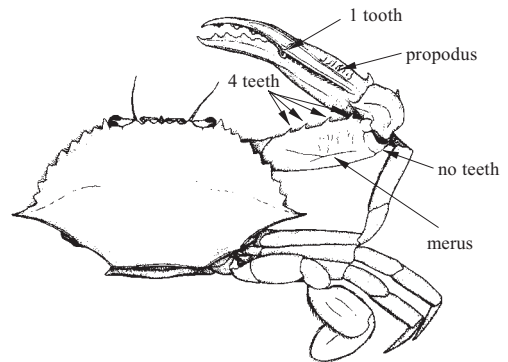


**Fig. 25** *Laleonectes vocans*

- 25a.** Posterior margin of merus of cheliped without or with 1 small distal spine; anterior margin of merus with 4 or 5 spines (Fig. 27) . . . . . (***Portunus***) → **26**
- 25b.** Posterior margin of merus of cheliped with 2 strong spines; anterior margin of merus with 3 spines (Fig. 26) . . . . . ***Sanquerus validus***
- 26a.** Posterior margin of merus of cheliped without or with small distal tooth; anterior margin of merus with 4 or 5 (occasionally 3, 6 or 7) spines; 2 distal teeth on superior margin of propodus of cheliped (Fig. 28) . . . . . → **27**
- 26b.** Posterior margin of merus of cheliped without teeth; anterior margin of merus with 4 spines; 1 distal tooth on superior margin of propodus of cheliped (Fig. 27) . . . . . ***Portunus sayi***  
**[Canary Islands, Morocco]**

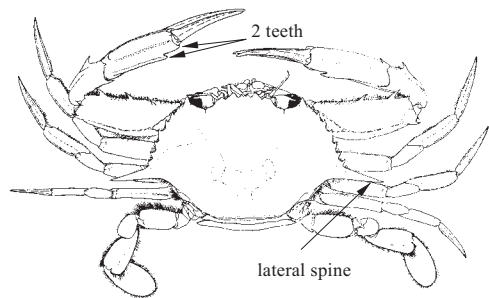


**Fig. 26** *Sanquerus validus*



**Fig. 27** *Portunus sayi*

- 27a.** Lateral spine of carapace straight, directed slightly to posterior (Fig. 28). . . . . ***Portunus anceps***  
**[Ascension]**
- 27b.** Lateral spine of carapace curved, directed slightly to anterior (Figs 29 and 30) . . . . . → **28**



**Fig. 28** *Portunus anceps*

- 28a. Carapace less than twice as broad as long (Fig. 29) . . . *Portunus inaequalis*  
[Senegal to Angola, Madeira, Cape Verde Islands]
- 28b. Carapace more than twice as broad as long (Fig. 30) . . . . . *Portunus hastatus*

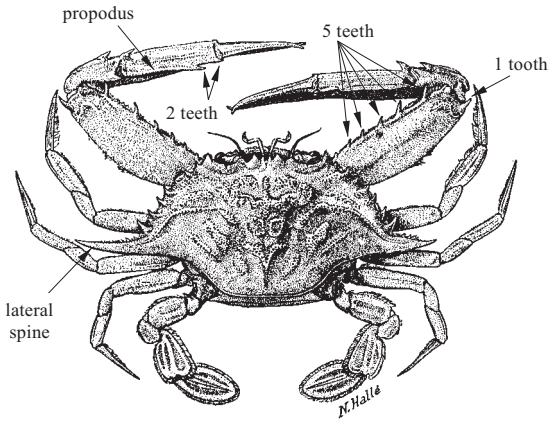


Fig. 29 *Portunus inaequalis*

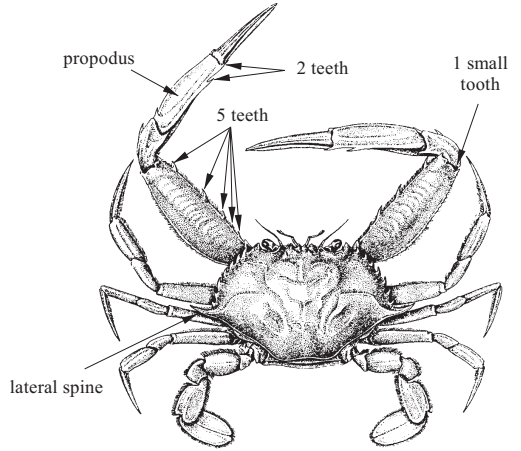


Fig. 30 *Portunus hastatus*

- 29a. Six anterolateral teeth on each side of carapace including the outer orbital tooth; frontal margin of carapace with 6 blunt teeth (inner orbital angle excluded) (Fig. 31) . . . *Charybdis helleri*  
[Guinea]
- 29b. Five anterolateral teeth on each side of carapace including the outer orbital tooth; frontal margin of carapace with 2 or 4 teeth (inner orbital angle excluded) . . . . . → 30
- 30a. Frontal margin of carapace with 2 very broad teeth giving the impression of a continuous margin with a median incision; last anterolateral tooth of carapace somewhat larger than preceding tooth; merus of fifth leg with 1 or several ventro-distal teeth (Fig. 32) . . . . . *Thalamita poissonii*  
[Senegal to Angola, Canary Islands, Mediterranean]
- 30b. Frontal margin of carapace with 4 more or less distinct teeth; last anterolateral tooth of carapace more than 2 times as long as preceding tooth (Figs 33 to 35); merus of fifth leg without ventrodistal teeth . . . . . (*Bathynectes*) → 31

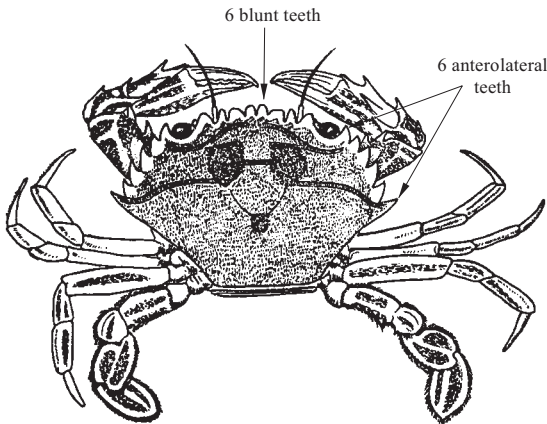


Fig. 31 *Charybdis helleri*

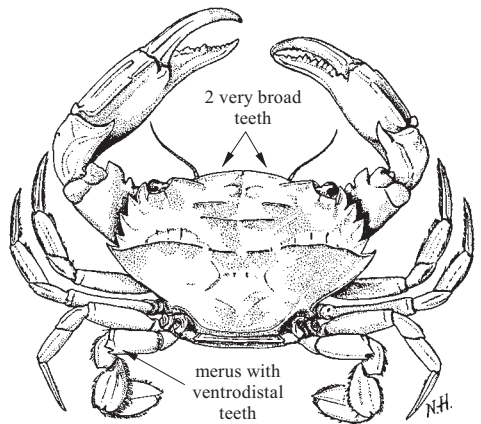


Fig. 32 *Thalamita poissonii*

31a. Frontal region of carapace without sub-median lobes or teeth; cheliped propodus and carpus without spines (Fig. 33) . . . . . ***Bathynectes longipes***  
**[England to Portugal, Madeira, Mediterranean]**

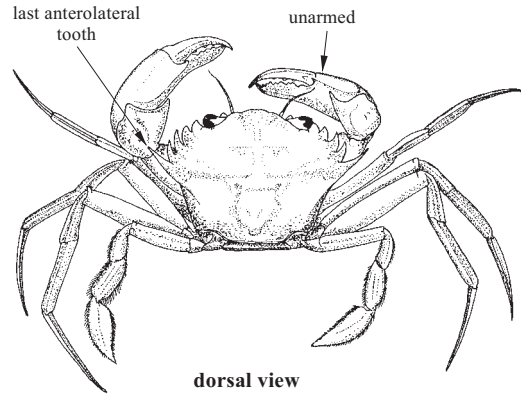


Fig. 33 *Bathynectes longipes*

31b. Frontal region of carapace with sub-median lobes or teeth; cheliped propodus and carpus with spines (Figs 34 and 35). . . . . → 32

32a. Frontal teeth blunt in adult specimens; submedian teeth distinctly narrower than the outer teeth; last anterolateral tooth of carapace about 2 times length of preceding tooth, curved forward in adults (Fig. 34). . . . . ***Bathynectes piperitus***  
**[Senegal to Angola, Cape Verde Islands, possibly Mauritania and Western Sahara]**

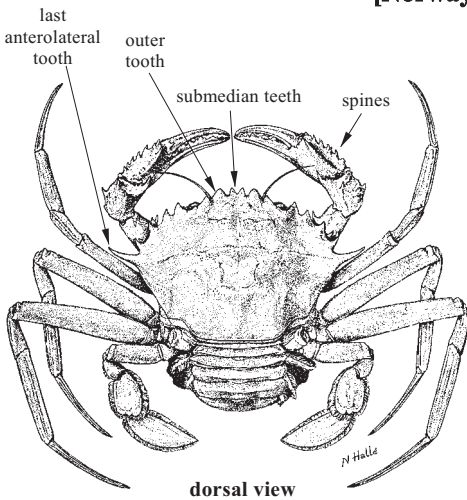


Fig. 34 *Bathynectes piperitus*

32b. Frontal teeth sharply pointed in adult specimens; submedian teeth hardly narrower than outer teeth; last anterolateral tooth of carapace about 3 times length of preceding tooth, straight (Fig. 35) . . . . . ***Bathynectes maravigna***  
**[Norway to Morocco, possibly to Mauritania, Mediterranean]**

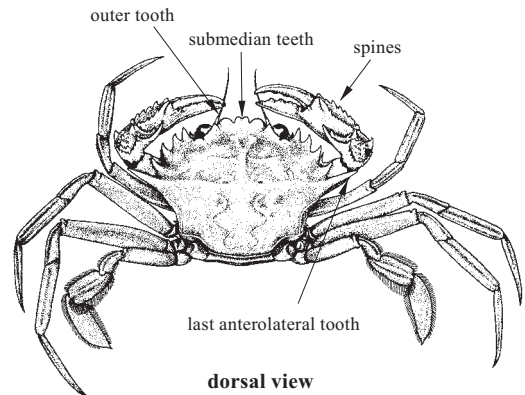






Fig. 35 *Bathynectes maravigna*

**List of species occurring in the area**

The symbol  is given when species accounts are included.

- Bathynectes longipes* (Risso, 1816).
- Bathynectes maravigna* (Prestandera, 1839).
- Bathynectes piperitus* Manning and Holthuis, 1981.

-  *Callinectes annicola* (De Rochebrune, 1883).
-  *Callinectes marginatus* (A. Milne Edwards, 1861).
-  *Callinectes pallidus* (Do Rochebrune, 1883).

- Carcinus aestuarii* Nardo, 1847.  
 *Carcinus maenas* (Linnaeus, 1758).  
*Charybdis helleri* (A. Milne Edwards, 1867).  
 *Cronius ruber* (Lamarck, 1818).  
*Laleonectes vocans* (A. Milne Edwards, 1878).  
 *Liocarcinus corrugatus* (Pennant, 1777).  
*Liocarcinus depurator* (Linnaeus, 1758).  
*Liocarcinus holsatus* (Fabricius, 1798).  
*Liocarcinus marmoreus* (Leach, 1814).  
*Liocarcinus navigator* (Herbst, 1794).  
*Liocarcinus pusillus* (Leach, 1815).  
*Liocarcinus vernalis* (Risso, 1816).  
*Liocarcinus zariquieyi* Gordon, 1968.  
*Macropipus australis* Guinot, 1961.  
*Macropipus rugosus* (Doflein, 1904).  
*Macropipus tuberculatus* (Roux, 1830).  
 *Necora puber* (Linnaeus, 1758).  
*Polybius henslowii* Leach, 1820.  
*Portumnus latipes* (Pennant, 1777).  
*Portunus anceps* (De Sausure, 1858).  
 *Portunus hastatus* (Linnaeus, 1767).  
*Portunus inaequalis* (Miers, 1881).  
*Portunus sayi* (Gibbes, 1850).  
 *Sanquerus validus* (Herklots, 1851).  
*Thalamita poissonii* (Audouin, 1826).  
*Xaiva biguttata* (Risso, 1816).  
*Xaiva mcleayi* (Barnard, 1947).

## References

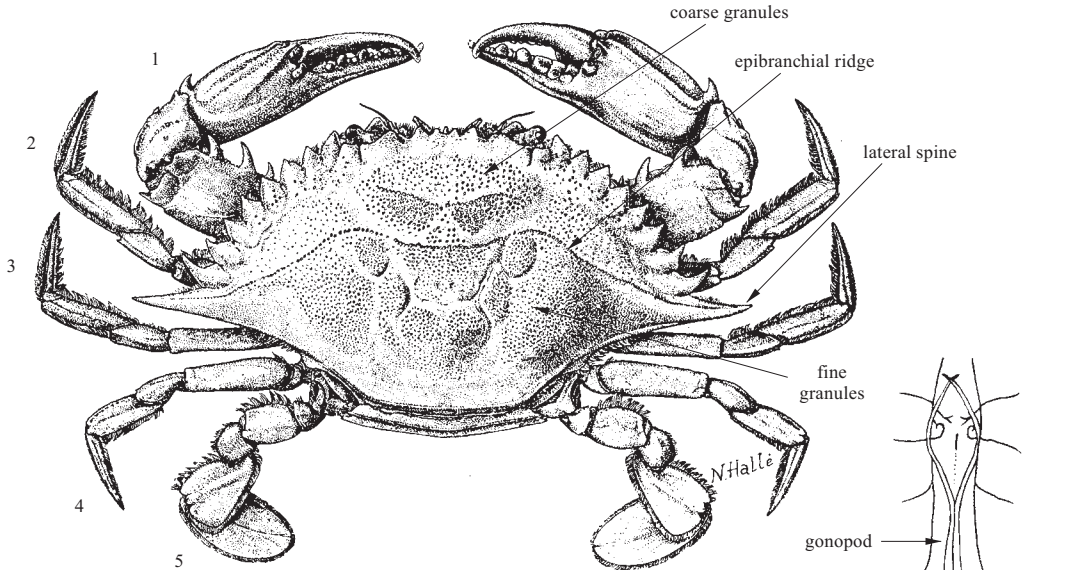
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***Callinectes amnicola* (De Rochebrune, 1883)**

**Frequent synonyms / misidentifications:** *Callinectes latimanus* Rathbun, 1897 / None.

**FAO names:** **En** – Bigfisted swimcrab; **Fr** – Crabe bicorne; **Sp** – Cangrejo tijeron.



**Diagnostic characters:** Carapace broad, ending laterally in a strong spine, preceded on the lateral margin by 8 distinct teeth (including the external orbital angle); **length of lateral spine twice or more than that of preceding tooth; width of carapace twice or slightly more than twice its length** (lateral spines included), its upper surface somewhat convex and roughly granular; **a rather straight granular epibranchial ridge extends from large lateral spine inward**. Front with 4 teeth, **inner pair triangular and only half or slightly more than half as long as outer pair**. Chelipeds strong, unequal, pincers with distinct ridges; last walking leg with propodus and dactylus broad and flat, paddle-shaped. **Male gonopods (copulatory organs beneath abdomen) very long, reaching almost to end of abdomen, their tips curved inward and crossing each other**. **Colour:** described variously as olive brown mottled and as blue or bluish with pink; the legs seem to be paler than the carapace.

**Size:** Maximum carapace length 7.5 cm, carapace width 15.1 cm (including the lateral spines; without these: 12.5 cm).

**Habitat, biology, and fisheries:** An estuarine species found in fresh, brackish and salt water. Fished for probably throughout its range, certainly between Senegal and Gabon. *C. amnicola* usually is taken with the 2 other species of *Callinectes* and as a rule no distinction between the 3 species is made by the fishermen. Caught with hand nets, square nets, crab pots and even on hook-and-line. The catches are used locally and sold fresh, cooked, or fried in palm oil. These crabs are very well liked and eaten practically everywhere they occur.

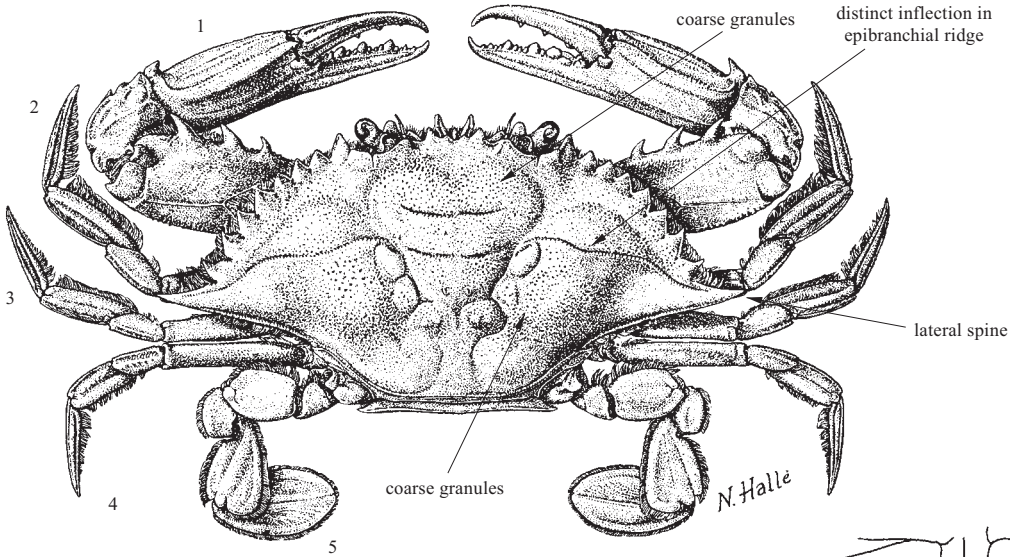
**Distribution:** East Atlantic: Cape Verde Islands and Mauritania to Angola.



***Callinectes marginatus* (A. Milne Edwards, 1861)**

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

**FAO names:** En – Marbled swimcrab; Fr – Crabe marbré; Sp – Cangrejo jaspeado.

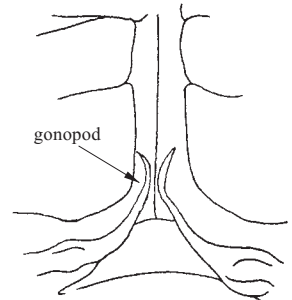


**Diagnostic characters:** Carapace broad, ending laterally in a strong spine preceded on the lateral margin by 8 distinct teeth (including the external orbital angle); **length of lateral spine about twice that of preceding tooth; width of carapace slightly more than twice its length** (lateral spines included), its dorsal surface slightly convex with a fine, dense and uniformly distributed granulation; **granular epibranchial ridge** extending from lateral spines inward **with a distinct inflection near its midlength**. Front with 4 teeth, **inner pair very small, distinctly less than half as long as outer teeth**. Chelipeds strong, unequal, with distinct granular ridges; last walking leg with both dactylus and propodus, broad and flat, paddle-shaped. **Male gonopods short, failing to reach end of sternite of third walking legs, their distal part somewhat curved outward; left and right gonopods usually do not touch.** **Colour:** carapace with a marbled colour pattern, which seem to be characteristic of the species.

**Size:** Maximum carapace width (including the lateral spines) 9.7 cm.

**Habitat, biology, and fisheries:** Found in shallow salt water on sandy or sandy mud bottom, rather more marine than estuarine. Fished intensively, probably throughout its range. In most accounts on the economic importance of West African Crustacea no distinction is made between the various species of *Callinectes*. Taken with hand nets, square nets, crab pots and on hook-and-line. Sold locally for immediate consumption, either fresh, cooked, or fried in oil.

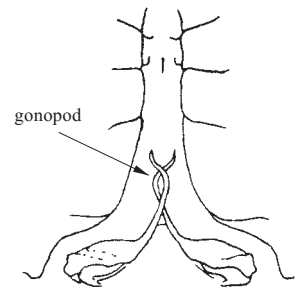
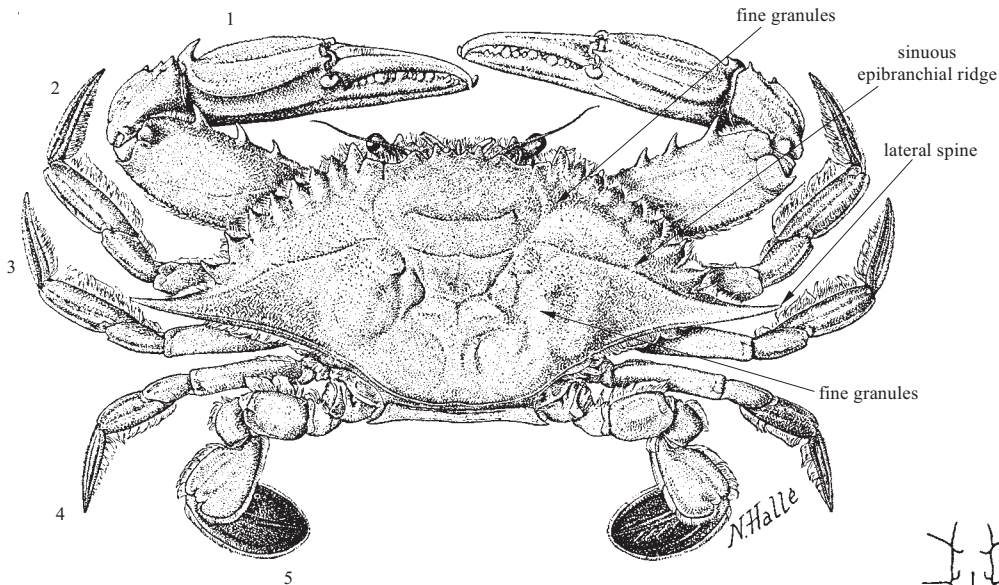
**Distribution:** East Atlantic: Cape Verde Islands and from Mauritania to central Angola.



***Callinectes pallidus* (De Rochebrune, 1883)**

**Frequent synonyms / misidentifications:** *Callinectes gladiator* Benedict, 1893.

**FAO names:** En – Gladiator swimcrab; Fr – Crabe gladiateur; Sp – Cangrejo gladiator.



**Diagnostic characters:** Carapace very broad, almost 2.5 times wider than long, and flatter than that of other West African species of this genus; anterolateral margin of carapace with 8 usually sharp, teeth (including outer orbital angle) followed by a very long lateral spine (almost 3 times as long as preceding tooth); surface very finely and uniformly granular, granular epibranchial ridge which extends inward from lateral spine sinuous without median inflection. Front with 4 teeth, inner pair slightly less than half as long as outer teeth. First abdominal segment laterally ending in a sharp point. Chelipeds unequal, with usually distinct granular ridges. **Male gonopods short, failing to reach end of sternite of third walking legs**, regularly curved outward, tips recurved inward. **Colour:** carapace described as brown, dark brown, almost black and grey; legs blue.

**Size:** Maximum carapace width 10.9 cm, carapace length 4.5 cm.

**Habitat, biology, and fisheries:** In brackish and salt water at depths of less than 30 m on bottoms of mud or sand. Fished for intensively throughout its range. In most accounts on the economic importance of West African Crustacea no distinction is made between the species of *Callinectes*. Taken with hand nets, square nets, crab pots and hook-and-line. Sold locally for immediate consumption, either fresh, cooked or fried in oil.

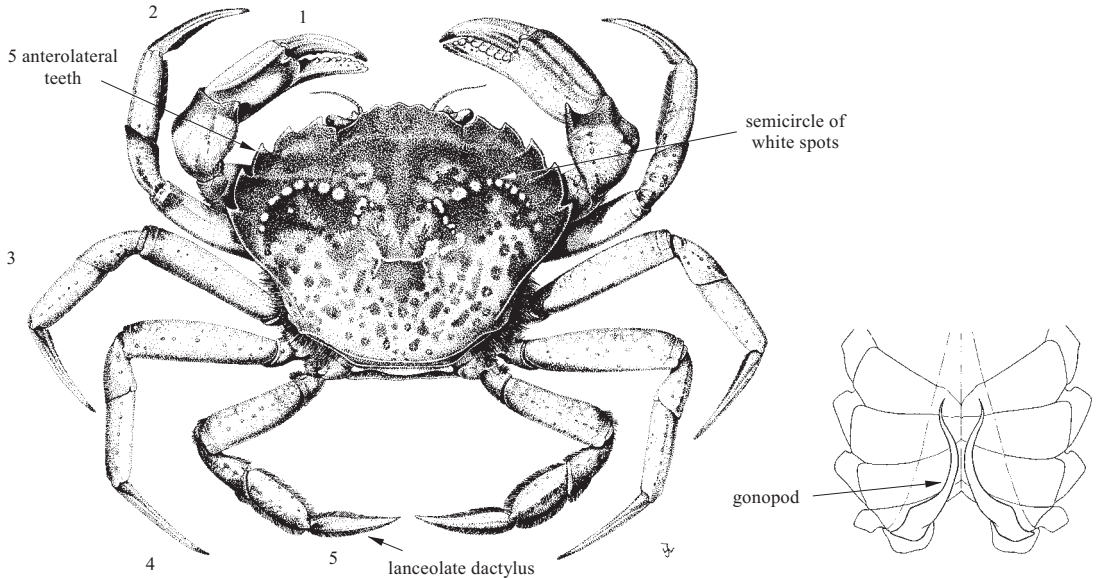
**Distribution:** East Atlantic: Mauritania to Angola.



***Carcinus maenas* (Linnaeus, 1758)**

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

**FAO names:** **En** – Green crab; **Fr** – Crabe vert; **Sp** – Cangrejo verde.



**Diagnostic characters:** Body rather flat, finely granular and hardly pubescent, with discrete regions. Front with 3 blunt teeth or lobes; **anterolateral margins cut into 5 rather blunt teeth** (including outer orbital angle). Chelipeds strong, asymmetrical, larger with blunt, molar-like teeth on basal part of finger and a single tooth on carpus; walking legs slender; last pair with distal 2 segments clearly more flattened than in previous legs and with fringe of hairs; **dactylus of last leg lanceolate, pointed, not paddle-shaped. Male gonopods curved outward.** **Colour:** rather variable, adults usually deep green mottled with brown and blackish and a semicircle of whitish spots on each half of the carapace. Juveniles often with rather large and conspicuous white areas. Lower surface yellowish or whitish; in some specimens legs and lower surface brownish orange.

**Size:** Maximum carapace width 7.7 cm, carapace length 6 cm; usually the adults are about 5 cm wide and 4 cm long.

**Habitat, biology, and fisheries:** Lives in shallow water from the intertidal area down to a few metres depth; deeper records (there are from as deep as 200 m) must be regarded with suspicion. Found under stones, on muddy or muddy sand bottoms, or hard bottom, etc., and seems not to be very particular about its habitat preferences. No special fishery. Collected by hand at low tide, or with seines, usually forms an accidental addition to the catch. In the Moroccan fish markets the species is sold cooked or fresh, but the consumption is limited (Gruvel, 1923, *Mém.Soc.Sci.nat.Maroc*, 3(2): 85).

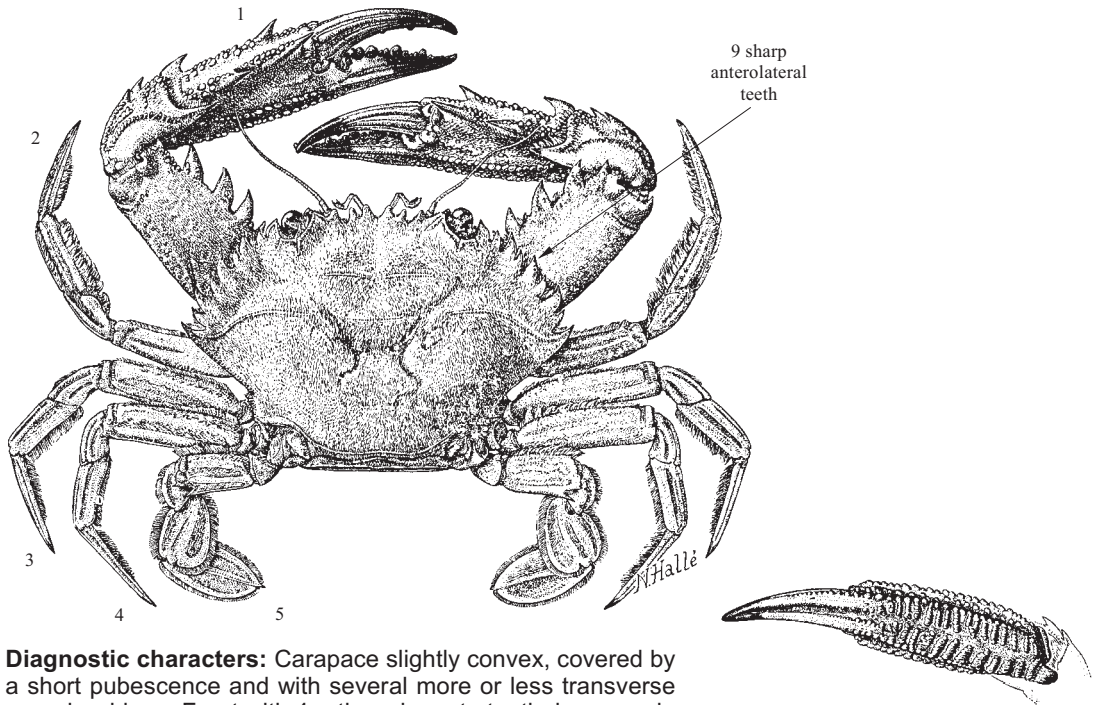
**Distribution:** East Atlantic: only known from the coast of Morocco and northern Mauritania (Cape Blanc); northwards extending along the Atlantic coast of Europe to northern Norway and the Western Baltic. Absent from the Mediterranean (where it is replaced by *Carcinus aestuarii* Nardo, 1847). Central Atlantic: Iceland. West Atlantic: from Nova Scotia, Canada to Virginia, USA. Australia: southeast coast, probably being introduced there. Other records of the species from South America and the Indo-West Pacific region are based on mislabelled specimens or accidentally introduced stray specimens, which did not settle.



***Cronius ruber*** (Lamarck, 1818)

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

**FAO names:** **En** – Red swimcrab; **Fr** – Crabe rouge; **Sp** – Cangrejo colorado.



**Diagnostic characters:** Carapace slightly convex, covered by a short pubescence and with several more or less transverse granular ridges. Front with 4 rather elongate teeth, inner angle of orbit triangular with a sharp tooth; **anterolateral margin of carapace bearing 9 sharp teeth**, which alternate in size, **posterior tooth not conspicuously enlarged**. Chelipeds slightly unequal, with granular ridges and teeth; 4 spines on carpus and 4 on upper surface of palm; **lower surface of palm covered by transverse rows of coarse granules**; walking legs slender, propodus and dactylus of last pair flat and broad, paddle-shaped, merus of this leg with a ventrodistal spine. **Colour:** body and legs purplish red, marbled with lighter colour, finger tips and the apices of numerous spines black; pubescence brown.

**Size:** Maximum carapace width 8.2 cm, carapace length 5.2 cm. Usually distinctly smaller.

**Habitat, biology, and fisheries:** Known from the intertidal zone to a depth of 38 m, usually at less than 20 m; on different types of bottom, usually with a cover of algae, ascidia, etc. No special fishery. Apart from Monod's (1967, *Mém. Inst. fondamentale Afrigue Noire*, 77: 180) listing of the species among "les Crabes ouest-africains comestibles" (:178), the author has not been able to find any data about fishery or consumption of this species.

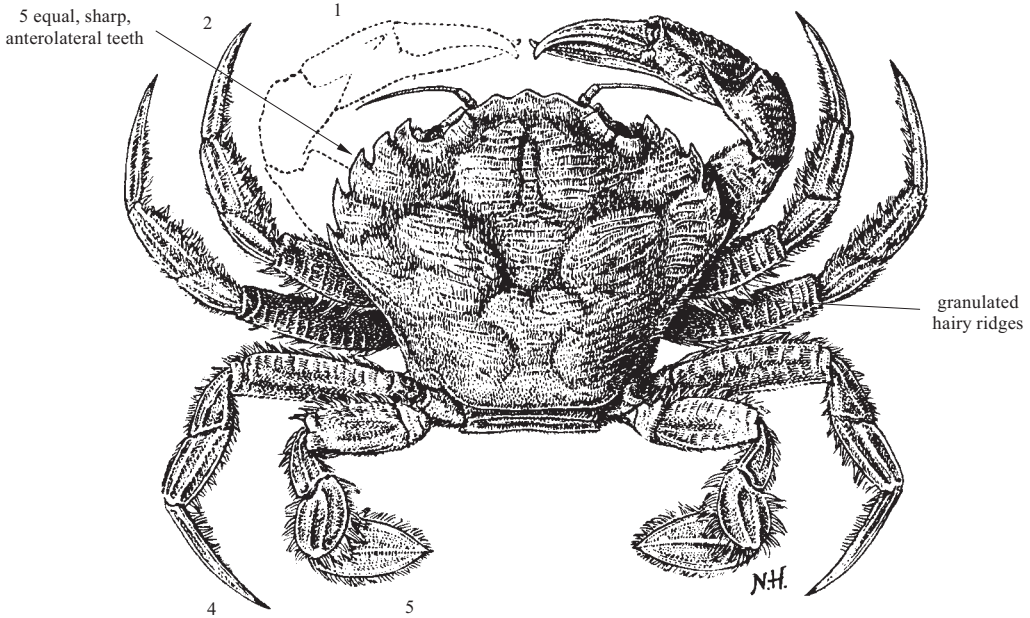
**Distribution:** East Atlantic: from Senegal and the Cape Verde Islands to Angola. Western Atlantic: South Carolina, USA to Brazil. Eastern Pacific: Baja California, Mexico, to Peru and Galapagos Islands.



***Liocarcinus corrugatus* (Pennant, 1777)**

**Frequent synonyms / misidentifications:** *Portunus corrugatus* (Pennant, 1777); *Macropipus corrugatus* (Pennant, 1777); *Polybius (Necora) corrugatus* (Pennant, 1777) / None.

**FAO names:** En – Wrinkled swimcrab; Fr – Étrille ballant; Sp – Cangrejo de arrugas.



**Diagnostic characters:** Carapace somewhat convex, **crossed by numerous very strong, granulated and hairy ridges**; front ending in 3 broad, triangular, blunt teeth; **anterolateral margin with 5 about equal, sharp teeth** (including outer orbital angle). Legs and lower surface of body with numerous hairy ridges; palm of cheliped with squamiform ridges and longitudinal rows of granules, fingers with strong longitudinal ridges; last pair of walking legs with dactylus and propodus flat and wide, paddle-shaped, dactylus with 1 median ridge, propodus with 2. **Colour:** yellowish, mottled with reddish brown, the brown colour usually predominating.

**Size:** Maximum carapace length 5 cm, carapace width 6 cm, but specimens usually much smaller, about 2 cm long and 2.4 cm wide.

**Habitat, biology, and fisheries:** Found from the littoral area to depths of 60 m, on coarse bottoms. No special fishery. Hardly of any commercial significance, and if taken, only appears as an admixture to other catches. Palombi and Santarelli (1961, *Gli animali commestibili dei mari d'Italia*, ed. 2:378, fig.) listed and figured this species among the edible Crustacea of Italy, it being taken by trawl. The only indication, known to the author, that the species is of commercial value in West Africa is the mention by Turkey (1976, *Boletim Museu municipal Funchal*, 30 (133): 66) of 2 specimens obtained at the fishmarket of Funchal, Madeira.

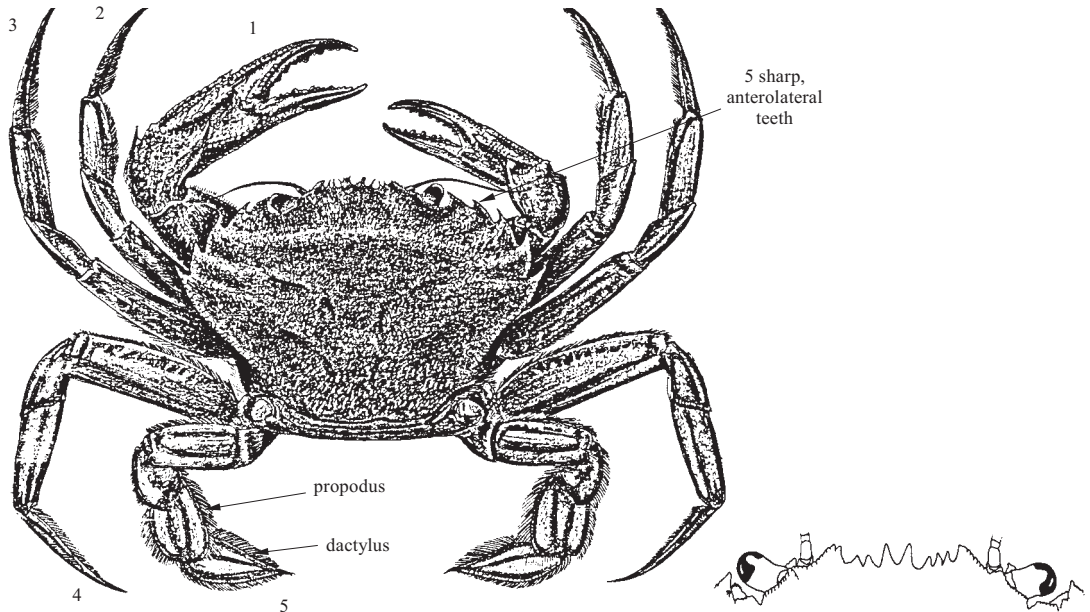
**Distribution:** East Atlantic: Morocco to Angola including Madeira and the Cape Verde Islands; northward extending to the British Isles including the Mediterranean. Scattered records from the Indo-West Pacific: Red Sea, Japan, Australia, New Zealand.



***Necora puber* (Linnaeus, 1758)**

**Frequent synonyms / misidentifications:** *Macropipus puber* (Linnaeus, 1758); *Portunus puber* (Linnaeus, 1758); *Liocarcinus puber* (Linnaeus, 1758); *Polybius (Necora) puber* (Linnaeus, 1758) / None.

**FAO names:** **En** – Velvet swimcrab; **Fr** – Étrille commune; **Sp** – Nécora.



**Diagnostic characters:** Carapace rather flat, granulated and pubescent, but without ridges. **Front with about 10 narrow, sharp teeth**, which are rather irregularly placed, 2 innermost and 2 outermost generally distinctly broader than others; **anterolateral margins with 5 sharply pointed teeth** of about equal size. Legs with granular or smooth ridges and pubescent depressions; chelipeds somewhat unequal, with broad granular ridges on palm and narrow granular ridges on fingers; **last walking legs with dactylus and propodus flattened and broadened**, paddle-shaped; dactylus with 1 median ridge, propodus with 2 bordered by depressed pubescent areas. **Colour:** carapace reddish brown to very dark brown, with blue and reddish spots; legs reddish brown with large dark or bright blue areas; pubescence dark brown. **Cornea of eyes red.**

**Size:** Maximum carapace width 8.4 cm, carapace length 6.5 cm. Usually much smaller: carapace width about 5.5 cm, carapace length 4.5 cm.

**Habitat, biology, and fisheries:** On bottom of rock, sand or mud, in depths between intertidal and about 70 m, usually not deeper than 40 m. No special fishery. Mainly collected by hand, with hand nets, etc. Eaten in France and on the Iberian peninsula and offered for sale on the markets. In Morocco, *Necora puber* is sold cooked on some of the fish markets, but the consumption of it seems limited (Gravel, 1923, *Mém. Soc. Sci. nat. Maroc*, 3(2): 85).

**Distribution:** East Atlantic: off Morocco and Western Sahara; northward extending to southwestern Norway (61°N); few records from the western Mediterranean.

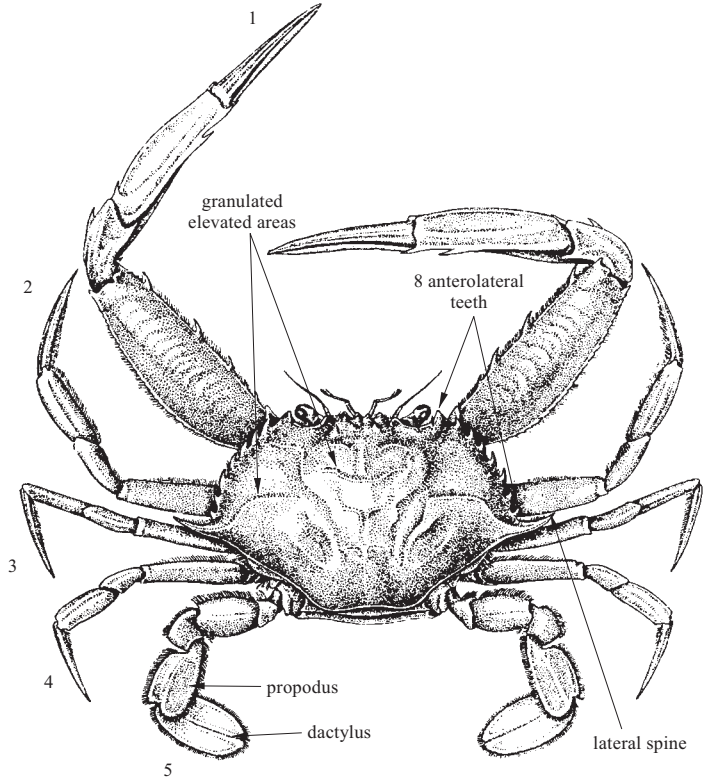


***Portunus hastatus* (Linnaeus, 1767)**

**Frequent synonyms / misidentifications:** *Neptunus hastatus* (Linnaeus, 1767) / None.

**FAO names:** En – Lancer swimcrab; Fr – Étrille nageuse; Sp – Jaiba cornuda.

**Diagnostic characters:** Carapace rather convex, with an irregular pattern of ridges and elevations, **between which there are pubescent depressed areas; elevated areas granular.** Front with 4 teeth, outer wider and slightly longer than inner, inner orbital angles bluntly triangular and shorter than frontal teeth; **anterolateral margins bearing 8 teeth**, first (=outer orbital angle) rather wide and blunt, following sharply pointed; **these anterolateral teeth followed by strong lateral spine**, which is about 3 times as long as last anterolateral tooth. Chelipeds slender, their palm showing several longitudinal granular ridges and 2 sharp anterodorsal spines, fingers also with ridges; similar ridges, separated by depressed pubescent areas present on other segments of leg; walking legs slender, with smooth longitudinal ridges on most segments, depressed areas between ridges pubescent; **last 2 segments of fifth pair of legs broad and flat, paddle-shaped; dactylus with 1 median ridge, propodus with 2;** also, margins of these segments raised, and **areas in between depressed and pubescent. Male abdomen triangular. Colour:** yellowish brown with red markings; especially the distal half of the fingers of the chelipeds and the broadened dactylus of the last walking leg may be bright red. Iridescent whitish spots present between bases of anterolateral teeth.



**Size:** Maximum carapace width 5.6 cm, carapace length 2.6 cm.

**Habitat, biology, and fisheries:** On sandy and muddy sand bottom, in depth of 1 to about 55 m. No special fishery. Taken in lobster pots, with vertical nets and with beach seines, usually as an admixture of the main catch. The commercial value is minor and often, the animals are thrown out as worthless. Turkey (1976, *Boletim Misesu municipal Funchal*, 30(133): 64) mentioned 2 specimens obtained at the fish market at Funchal, Madeira.

**Distribution:** East Atlantic: Madeira, Canary Islands, Cape Verde Islands, Mauritania and the coast of Angola. Also occurs throughout the Mediterranean and the Azores.

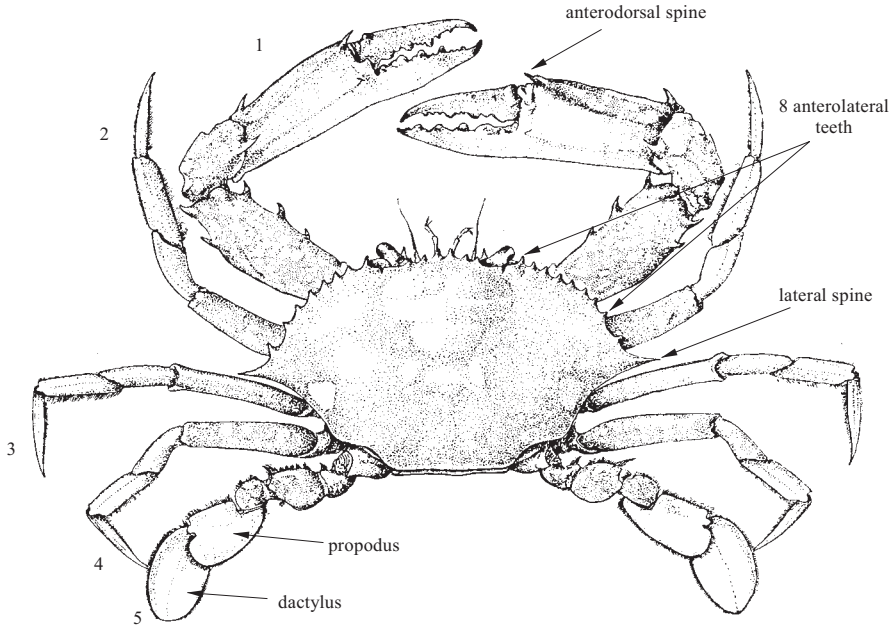




***Sanquerus validus*** (Herklots, 1851)

**Frequent synonyms / misidentifications:** *Neptunus validus* (Herklots, 1851); *Portunus validus* (Herklots, 1851) / None.

**FAO names:** **En** – Senegalese smooth swimcrab; **Fr** – Étrille lisse du Sénégal; **Sp** – Jaiba satinada.



**Diagnostic characters:** Carapace swollen and smooth, without transverse ridges. Front bearing 6 rather sharp, triangular teeth (including the inner orbital teeth); anterolateral margin with 8 similar, but slightly wider teeth followed by a sharp lateral spine, which is less than twice as long as last anterolateral tooth. Chelipeds unequal, smooth, with 3 ridges on outer surface of palm and 1 on inner surface; palm bearing a single anterodorsal spine; fingers with no distinct ridges; walking legs smooth, with some grooves on lateral surfaces, but no ridges nor depressed pubescent areas; dactylus and propodus of last walking leg strongly broadened and paddle-shaped. Abdomen of male triangular. **Colour:** carapace rather uniformly brownish to greenish grey or khaki colour, with a conspicuous large white spot on each side just before the posterolateral margin; upper surface of chelipeds and legs strikingly marbled with purple or blue, contrasting strongly with the rather uniformly coloured carapace. Lower surface of body uniformly whitish.

**Size:** This is the largest West African swimming crab, maximum carapace length 9.3 cm, maximum width 19 cm.

**Habitat, biology, and fisheries:** Found on bottoms consisting of sand or mud in depths from less than 1 m to about 55 m, mostly between 10 and 30 m. Shallow coastal waters. In Senegal the species is taken by shrimp trawlers in addition to shrimp, lobsters, etc.; the chelipeds are broken off and frozen, the rest of the animal is returned to the sea, after landing the chelae are shelled, cooked, frozen and packed in cartons for export (Baron, 1975, *Cahiers, ORSTOM (océanogr.)*, 13(2):103). Almost throughout its range the natives fish the species with either beach seines or with vertical nets; the animals are cooked or fried in oil. Although the species is common, it occurs never in great numbers and therefore is commercially of limited importance.

**Distribution:** East Atlantic: Mauritania to Angola.

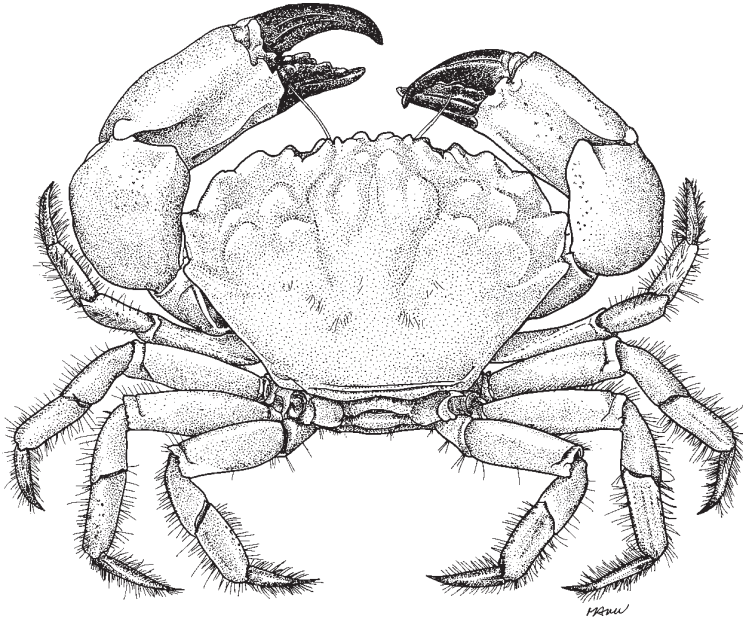


Superfamily XANTHOIDEA

MENIPPIDAE

Stone crabs

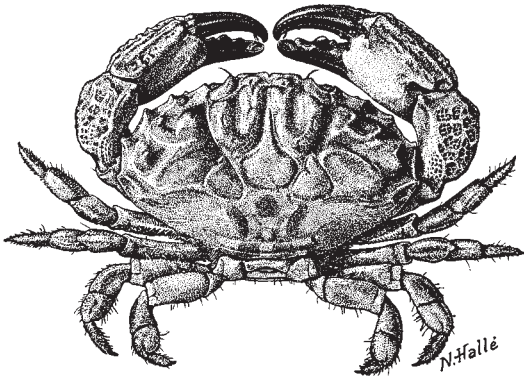
**Diagnostic characters:** Carapace ovate to quadrate. Eyes normal, orbits never reaching edge of carapace. Antennae positioned adjacent to antennules, flagellum always free. Frontal margin with 2 to 4 lobes or teeth. **Anterolateral margin with distinct lobes, teeth or spines.** Major chela with basal crushing molariform tooth; fingers of minor chela not forceps-like. **Male abdomen with 7 movable segments.** **Second gonopod in males longer than first; distal part of second gonopod developed into filiform flagellum.**



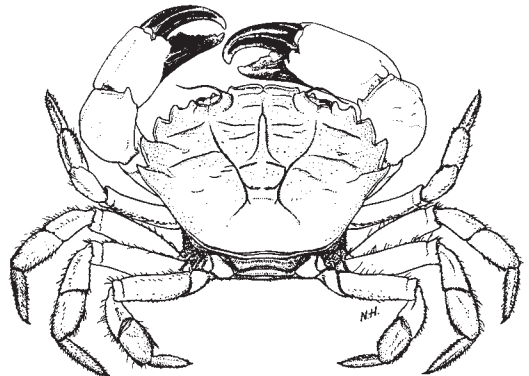
**Habitat, biology, and fisheries:** The 4 species occurring in this area are all found in coastal areas from the intertidal to the subtidal reaching depths of about 20 m, usually in rocky environments, under stones and among algae. Two species are of minor commercial interest.

**Similar families occurring in the area**

Xanthidae and Panopeidae: the males in these families have the abdomen divided into 5 segments; segments 3 to 5, even if their sutures are sometimes visible, are fused together into a single unit.

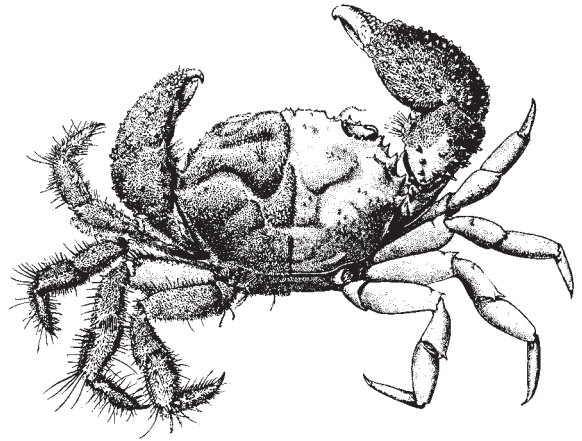
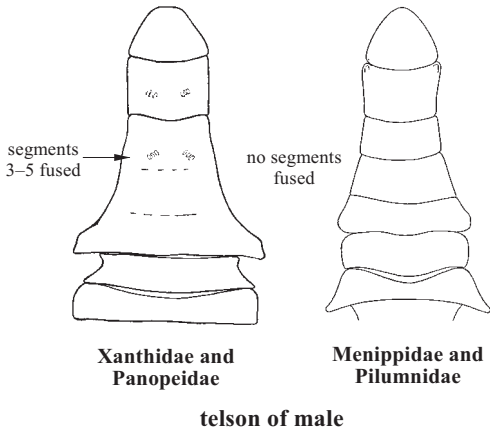


Xanthidae



Panopeidae

Panopeidae and Pilumnidae: in the males of these families the size of the second gonopod never exceeds that of the first gonopod; the distal part of the second gonopod is not developed into a filiform flagellum.



Pilumnidae

**Key to the genera and species of Menippidae occurring in the area**

- 1a. Carapace and chela smooth, without tubercles or spines (Fig. 1) . . . . . *Menippe nodifrons*
- 1b. Carapace and chela with tubercles or spines (Figs 2 to 4) . . . . . → 2
- 2a. Transversal granulous ridges behind frontal margin (Fig. 2) . . . . . *Eriphia verrucosa*
- 2b. Region behind frontal margin without transversal ridges (Figs 3 and 4) . . . . . → 3

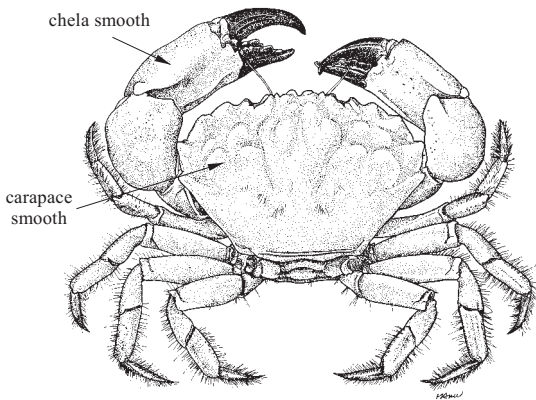


Fig. 1 *Menippe nodifrons*

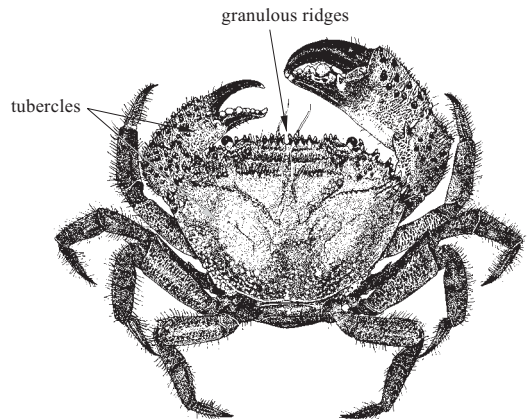


Fig. 2 *Eriphia verrucosa*

- 3a. Body with dense cover of hairs; front bilobed with spines; black part of fixed finger of chela in males extending on large part of palm (Fig. 3) . . . . . ***Eupilumnus africanus***
- 3b. Body with sparse cover of hairs; front almost entire, median notch very shallow, no spines; black part of fixed finger of chela in males not extending on palm (Fig. 4) . . ***Eupilumnus stridulans***

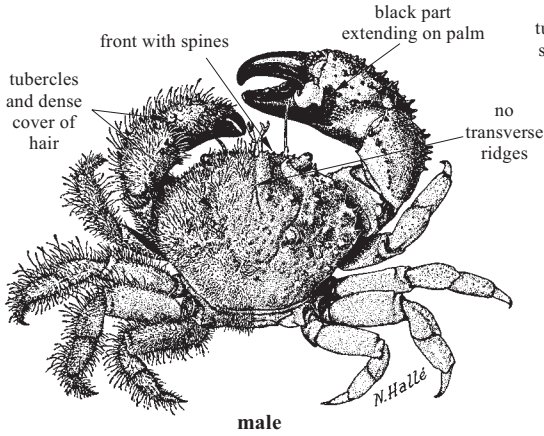


Fig. 3 *Eupilumnus africanus*

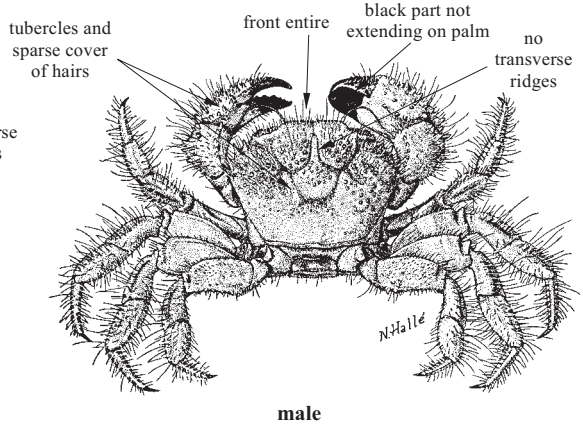





Fig. 4 *Eupilumnus stridulans*

**List of species of Menippidae occurring in the area**

The symbol  is given when species accounts are included.

-  *Eriphia verrucosa* (Forsskål, 1775).
- Eupilumnus africanus* (A. Milne Edwards, 1867).
- Eupilumnus stridulans* Monod, 1956.
-  *Menippe nodifrons* Stimpson, 1859.

**References**

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**Manning, R.B. & Holthuis, L.B.** 1981. West African brachyuran crabs (Crustacea: Decapoda). *Smithsonian Contributions to Zoology*, 306: 1–379.

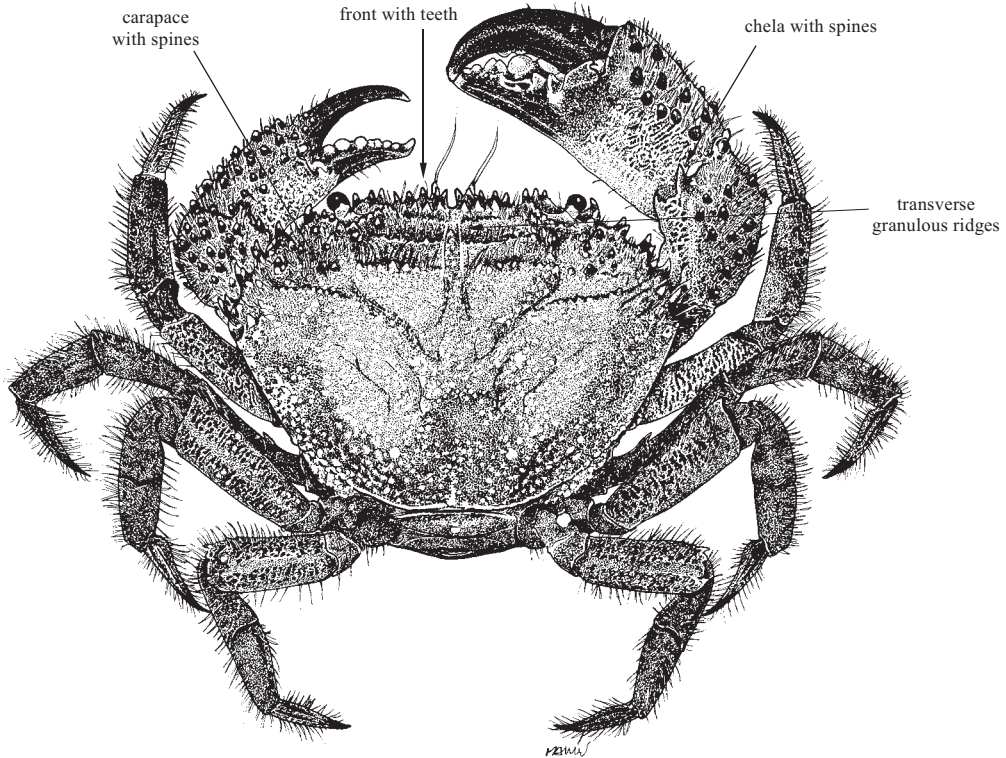
**Monod, T.** 1956. Hippidea et Brachyura ouest-africains. *Mémoires de l'Institut Français d'Afrique Noire*, 45: 1–674.

**Ng, P.K.L., Guinot, D. & Davie, P.J.F.** 2008. Systema Brachyurorum: Part I. An annotated checklist of extant brachyuran crabs of the world. *The Raffles Bulletin of Zoology*, supplement 17: 1–286.

***Eriphia verrucosa* (Forsskål, 1775)**

**Frequent synonyms / misidentifications:** *Eriphia spinifrons* (Herbst, 1785) / None.

**FAO names:** **En** – Warty crab; **Fr** – Crabe verruqueux; **Sp** – Cangrejo moruno.



**Diagnostic characters:** Carapace thick, upper surface slightly convex, **with transversal granulous ridges behind frontal margin and on lateral regions**. Frontal margin broad with distinct median incision, **each frontal lobe with 5 or 6 teeth, with a row of 4 or 5 teeth just behind it**. Orbits almost circular, strongly denticulate on inferior margin. **Anterolateral margin shorter than posterolateral margin, armed with 7 teeth of which the anterior teeth spinulate**. **Chelipeds strong, unequal**; major cheliped with large blunt tubercles and smaller acute spines in rows. Walking legs robust, dactyli with strong setae. **Male abdomen with 7 movable segments. Second gonopod in males longer than first; distal part of second gonopod developed into filiform flagellum**. **Colour:** brown-red or greenish brown with yellow markings; ventral side yellow; fingers dark brown.

**Size:** Maximum length 8 cm, width 10 cm, usually between 5 and 6.5 cm in length.

**Habitat, biology, and fisheries:** Occurring in the intertidal and upper subtidal in rocky areas, under stones and between algae. Of minor potential commercial interest. Known to be of local interest to fisheries in the Mediterranean. Marketed fresh.

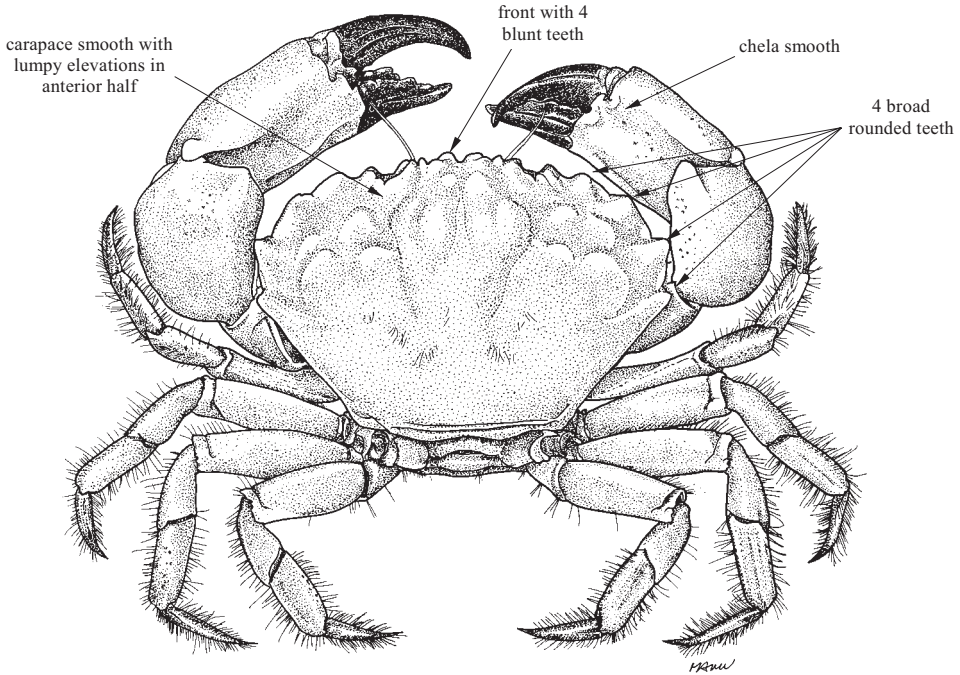
**Distribution:** East Atlantic: from the southern coast of Brittany to Mauritania, the Azores, Madeira, the Canary Islands and Ascension. Occurring in the Mediterranean and Black Sea.



***Menippe nodifrons* Stimpson, 1859**

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

**FAO names:** **En** – Lumpy stone crab; **Fr** – Crabe caillou guinéen; **Sp** – Cangrejo jorobado.



**Diagnostic characters:** Carapace transversely oval, **rather smooth, with about a dozen lumpy elevations on anterior half. Front with 4 blunt teeth** the inner pair much larger than the outer which are placed immediately besides the broad inner orbital angles; outer orbital angles each formed by 2 broad tubercles, 1 placed above the other; **anterolateral margin behind outer orbital angle with 4 broad, rounded teeth**, the anterior 2 very blunt, the last 2 more triangular. Pincers unequal, smooth, without granules or spines, fingers of large pincer with molar-like tooth at base; walking legs similar in shape, without spines, but with stiff hairs. **Colour:** body reddish, legs banded, fingers of pincers black.

**Size:** Maximum length of carapace for West Africa 4.5 cm (4.9 cm in American specimens) and width 6.5 cm for West Africa (7.2 cm in America).

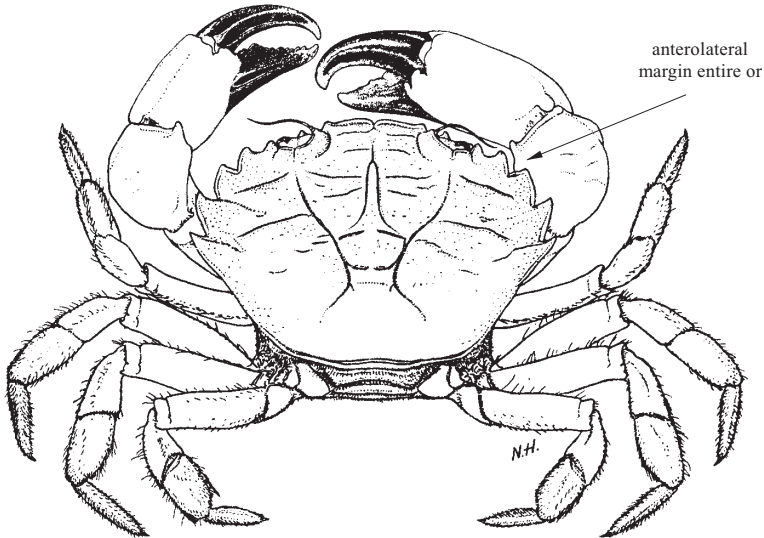
**Habitat, biology, and fisheries:** Inhabits the littoral and sublittoral down to a depth of 20 m, on rocky bottoms. No special fishery. The only author mentioning this species as edible in West Africa is Monod (1928, *L'industrie des Pêches au Cameroun*: 175), who reported that the species is eaten by the inhabitants of Cameroon, and evidently collected by hand. Monod (1967, *Mém. Inst. fondamental Afrique Noire*, 77: 180) again listed the species among the edible West African crabs.

**Distribution:** East Atlantic: Cape Verde Islands and Senegal to Angola. Western Central Atlantic: Florida to Brazil.



**PANOPEIDAE****Panopeid mud crabs**

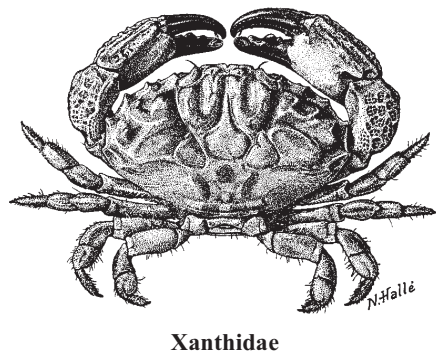
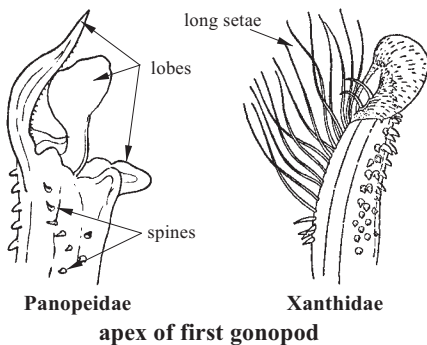
**Diagnostic characters:** Carapace usually hexagonal, transversely hexagonal or transversely **D**ovate. Eyes normal, orbits never reaching edge of carapace. Antennae positioned adjacent to antennules, flagellum always free. Frontal margin usually bilobed. **Anterolateral margins entire, or with 2 to 4 teeth or lobes.** Chelipeds with fingers pointed or spoon-like, subequal or markedly unequal, similar or dissimilar in form. **Male abdomen elongate and narrow, with segments 3 to 5 fused, covering most of sternite 4.** **First gonopod with apex with complex lobes or folds; often with spines and long setae.** **Second gonopod shorter than first gonopod.**



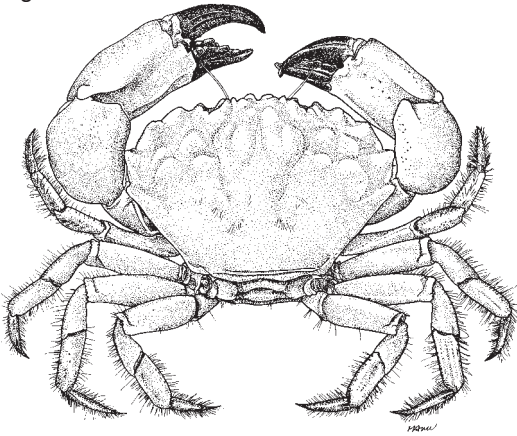
**Habitat, biology, and fisheries:** The 3 species occurring in this area are all found in coastal areas from the intertidal to subtidal to a depth of 30 m, estuarine and marine, burrowing in mud or found under stones in a muddy or rocky environment. One species is locally of minor commercial interest.

**Similar families present in the area**

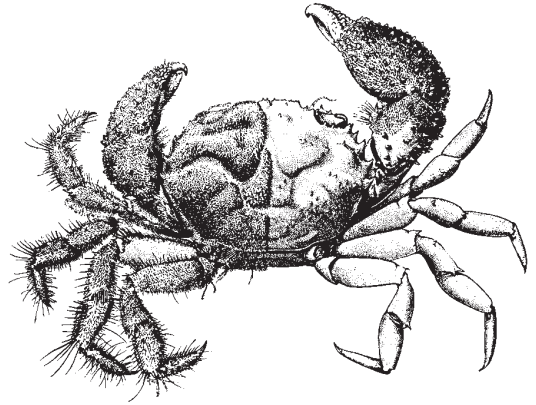
Xanthidae: very similar to Panopeidae but the first gonopods in males have a relatively simple apex, lacking complex lobes and folds, typically with long setae distally or subdistally.



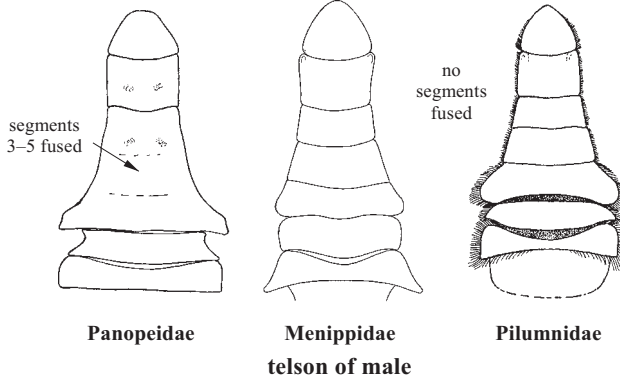
Menippidae and Pilumnidae: the males in these families have the abdomen divided into 7 movable segments.



Menippidae



Pilumnidae



Key to the species of Panopeidae occurring in the area

- 1a. Anterolateral margin with teeth bluntly rounded (Fig. 1) . . . . . *Eurypanopeus blanchardi*
- 1b. Anterolateral margin with pointed teeth (Figs 2 and 3a) . . . . . → 2

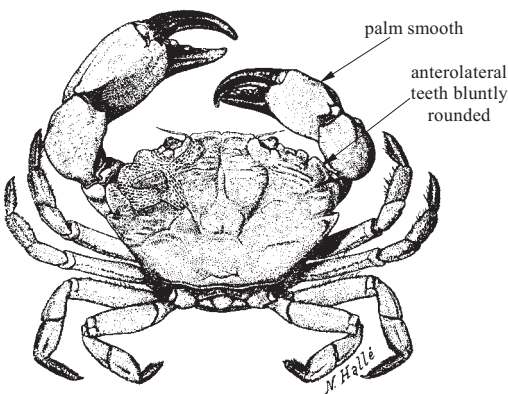


Fig. 1 *Eurypanopeus blanchardi*

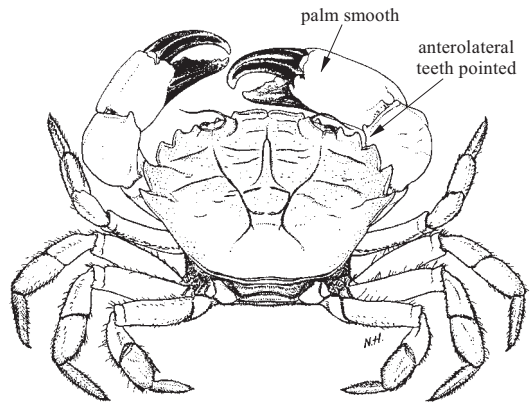
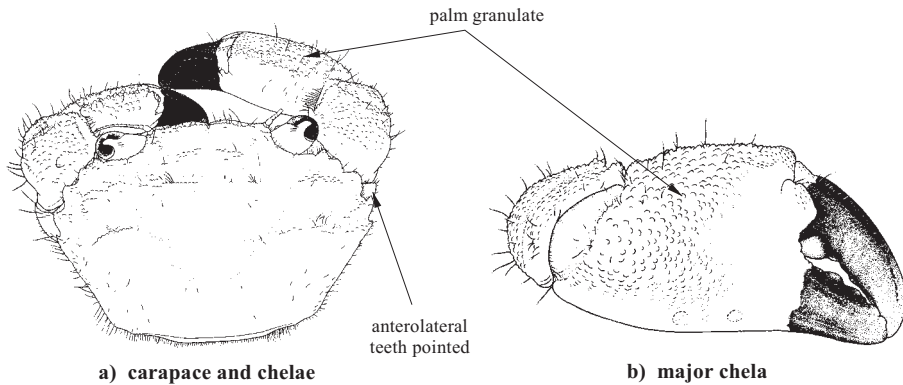


Fig. 2 *Panopeus africanus*




- 2a. Outer surface of palm smooth; moderately sized crab, maximum carapace breadth 5.5 cm (Fig. 2) . . . . . ***Panopeus africanus***
- 2b. Outer surface of palm granulate (Fig. 3b); small-sized crab, maximum carapace breadth 1.5 cm (Fig. 3a). . . . . ***Panopeus hartii***



**Fig. 3** *Panopeus hartii*

**List of species occurring in the area**

The symbol  is given when species accounts are included.

*Eurypanopeus blanchardi* (A. Milne Edwards, 1881).

 *Panopeus africanus* A. Milne Edwards, 1867.

*Panopeus hartii* Smith, 1869 [Ascension].

**References**

**Holthuis, L.B.** 1981. True Crabs. In W. Fischer, G. Bianchi & W.B. Scott, eds. *FAO species identification sheets for fishery purposes, Eastern Central Atlantic; Fishing Areas 34, 47 (in part)*. Rome, FAO. Vol. VI: pag.var.

**Manning, R.B. & Chace, F.A.** 1990. Decapod and stomatopod Crustacea from Ascension Island, South Atlantic Ocean. *Smithsonian Contributions to Zoology*, 503: 1–91.

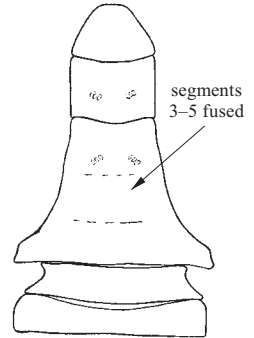
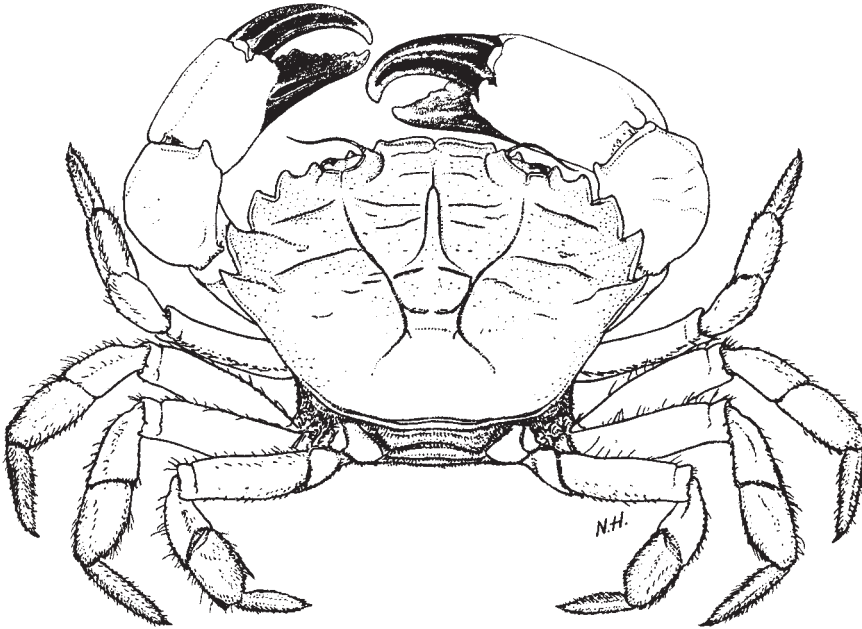
**Manning R.B. & Holthuis, L.B.** 1981. West African brachyuran crabs (Crustacea: Decapoda). *Smithsonian Contributions to Zoology*, 306: 1–379.

**Monod, T.** 1956. Hippidea et Brachyura ouest-africains. *Mémoires de l'Institut Français d'Afrique Noire*, 45: 1–674.

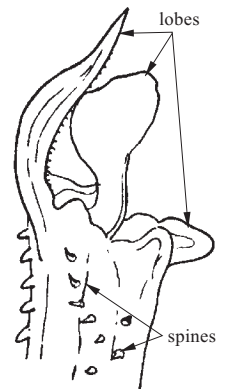
*Panopeus africanus* A. Milne Edwards, 1867

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

**FAO names:** En – African mud crab; Fr – Crabe caillou africain; Sp – Cangrejo de piedra africano.



telson of male



apex of first gonopod in males

**Diagnostic characters:** Carapace hexagonal, rather flat, with some transverse rows of small granules on anterior half. Front incised in middle and divided into 4 lobes, inner 2 broad and slightly convex, outer small and more triangular; outer orbital angle blunt, tooth-like, followed by 4 larger, pointed anterolateral teeth, which are rather flat, last of these ending in a narrow point. Chelipeds massive and unequal; outer surface of palm smooth, its upper margin with 2 indistinct ridges; carpus bearing a blunt inner tooth, and a few blunt tubercles on upper surface; walking legs slender and similar in shape, pubescent, but lack spines or spinules. Male abdomen elongate and narrow, with segments 3 to 5 fused, covering most of sternite 4. First gonopod with apex with complex lobes or folds; often with spines and long setae. Second gonopod shorter than first gonopod. **Colour:** reddish brown with a brownish pubescence and dark brown or black fingers with lighter tips.

**Size:** Maximum carapace length 3.4 cm and carapace width 5.15 cm.

**Habitat, biology, and fisheries:** Intertidal and subtidal to a depth of about 4 m, estuarine and marine, burrowing in mud or found under stones in a muddy or rocky environment. No special fishery. Collected by hand in the intertidal region. Used as food in Cameroon (Monod, 1928, L'Industrie des pêches au Cameroun: 175).

**Distribution:** Eastern Atlantic: south coast of Portugal and southwest coast of Spain south to Angola.



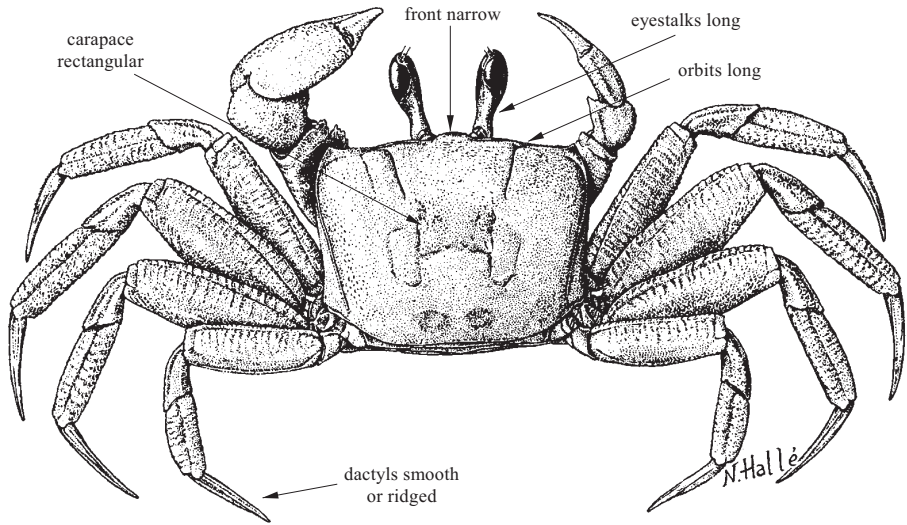
**Subsection THORACOTREMATA**

**Superfamily OCYPODOIDEA**

**OCYPODIDAE**

**Ghost crabs, fiddler crabs**

**Diagnostic characters:** Carapace usually rectangular or nearly so; front relatively narrow and somewhat bent downward, without teeth; orbits occupying whole anterior border outside front, outer walls of orbits often open, **eyestalks long** (longer than width of front); **third maxillipeds usually completely covering mouth cavity**; last 4 pairs of walking legs similar (apart from differences in length and pubescence), with hairs and granules; **dactyls smooth or ridged but not conspicuously spiny**.

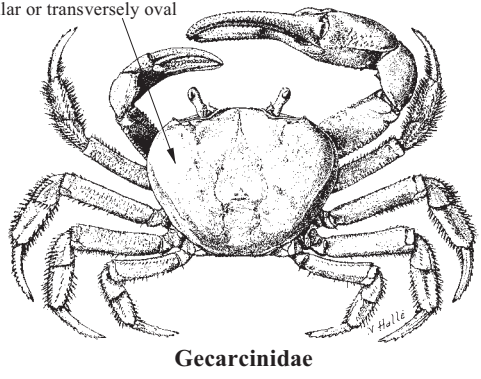
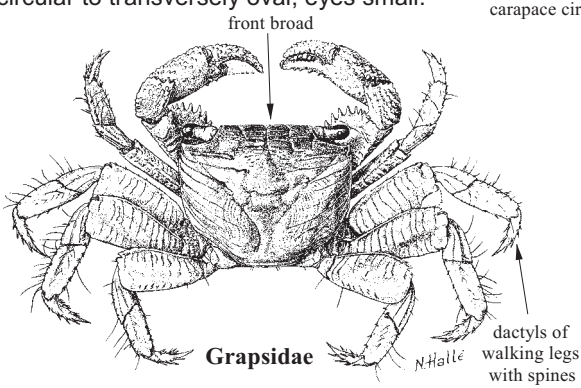


**Habitat, biology, and fisheries:** Terrestrial crabs. Common on sandy beaches (*Ocypode*) and on mudflats and in mangrove areas (*Uca*). Caught by hand and in baited traps. Only of minor local importance.

**Similar families occurring in the area**

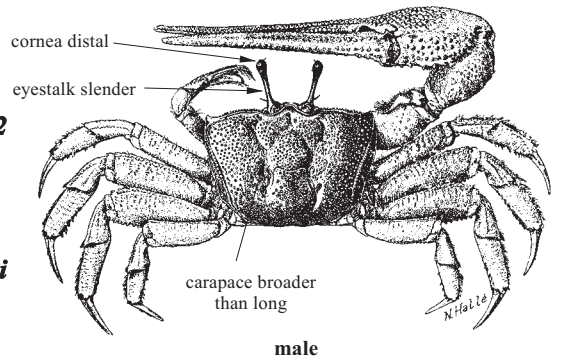
**Grapsidae:** a rhomboidal gap present between the third maxillipeds; the frontal margin of the carapace is much wider; eyestalks not as long as in ocypodids; dactyls with of walking legs with distinct spines.

**Gecarcinidae:** also terrestrial animals; a rhomboidal gap present between the third maxillipeds; carapace circular to transversely oval; eyes small.

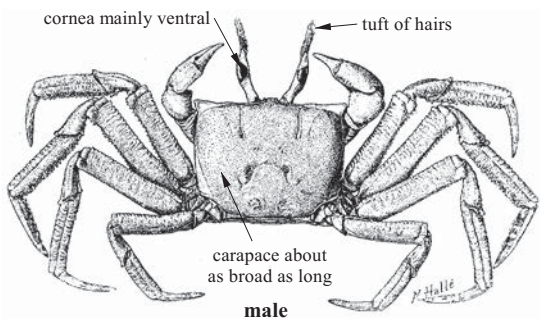


**Key to the species of Ocypodidae occurring in the area**

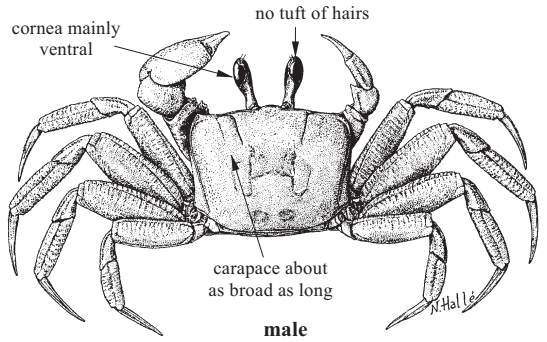
- 1a. Carapace about as broad as long; cornea occupying larger part of ventral side of eyestalk; chelipeds unequal in both sexes (Figs 2 and 3) . . . . . → 2
- 1b. Carapace broader than long; cornea small, only in distal part of eyestalk; chelipeds very unequal in males, small and similar in females (Fig. 1) . . . . . ***Uca tangeri***
- 2a. Eyestalks with a tuft of hairs distally (Fig. 2) . . . . . ***Ocypode cursor***
- 2b. Eyestalks without a tuft of hairs (Fig. 3) . . . . . ***Ocypode africana***



male  
**Fig. 1 *Uca tangeri***







**Fig. 2 *Ocypode cursor***



**Fig. 3 *Ocypode africana***

**List of species of Ocypodidae occurring in the area**

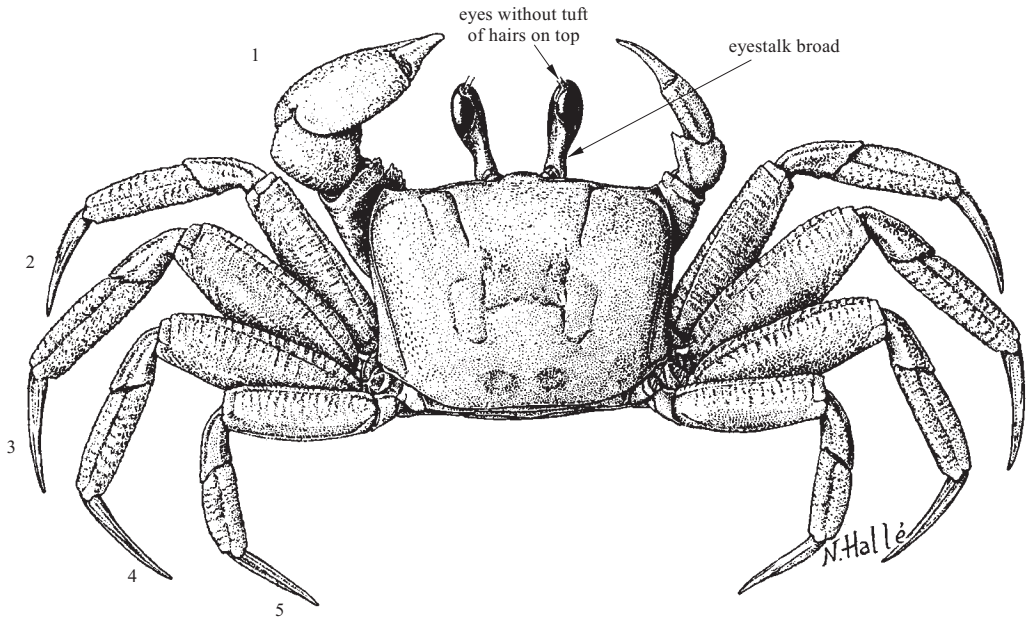
The symbol  is given when species accounts are included.

-  *Ocypode africana* De Man, 1881.
-  *Ocypode cursor* (Linnaeus, 1758).
-  *Uca tangeri* (Eydoux, 1835).

**References**

**Manning R.B. & Holthuis, L.B.** 1981. West African brachyuran crabs (Crustacea: Decapoda). *Smithsonian Contributions to Zoology*, 306: 1–379.

**Monod, T.** 1956. Hippidea et Brachyura ouest-africains. *Mémoires de l'Institut Français d'Afrique Noire*, 45: 1–674.

***Ocypode africana* De Man, 1881****Frequent synonyms / misidentifications:** None / None.**FAO names:** En – African ghost crab; Fr – Ocypode africain; Sp – Capuco africano.

**Diagnostic characters:** Body squarish, slightly narrowing posteriorly; upper surface slightly convex, evenly granular with some grooves. Front less than half as wide as the orbits and without spines; anterolateral margin without teeth apart from outer orbital angle; eyes long, but without a **tuft of hairs at top**. **Walking legs without brushes of hairs on the dactyl.** **Colour:** adult animals are reddish, purplish or more brownish; juveniles are usually mottled with brown and yellow and have the legs with dark bands.

**Size:** Maximum carapace width 3.4 cm.

**Habitat, biology, and fisheries:** On sandy beaches at and above the tide line. No special fishery. Caught by hand, baited traps (kerosene cans dug into the ground), cast-nets, nooses, etc. Cooked and eaten, at least in Ghana, where it is "much sought after as food" (Irvine, 1947, *Fishes and Fisheries of the Gold Coast*: 287). Monod (1928, *L'industrie des pêches au Cameroun*: 123) remarked that he had never seen the local inhabitants collect these species (*Ocypode africana* and *O. cursor*) which are too small to be consumed in the ordinary way, but may be used for the preparation of a tasty soup ("potage au tourlourou").

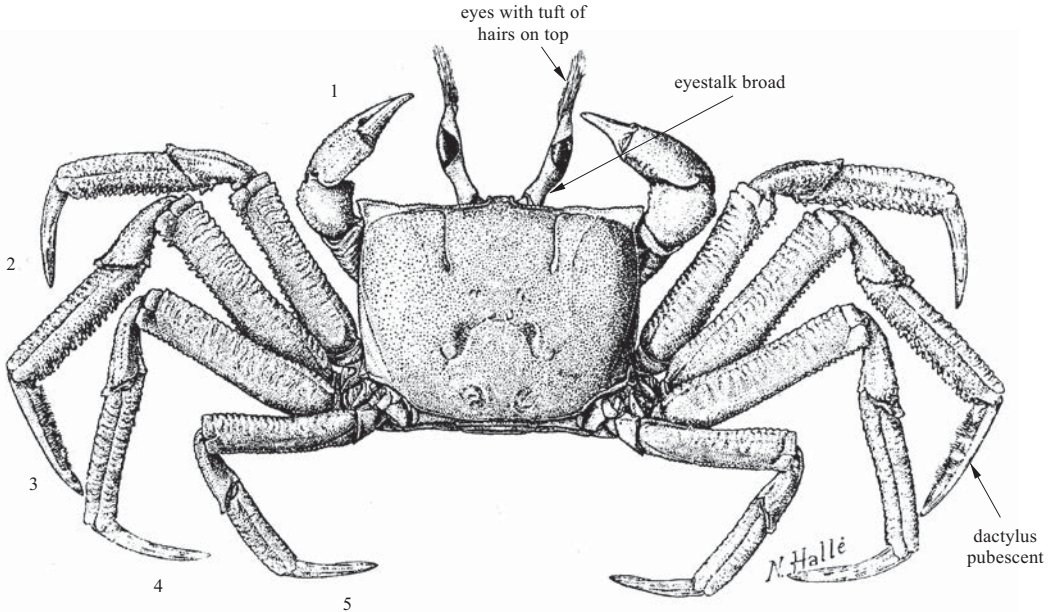
**Distribution:** East Atlantic: Mauritania to northern Namibia and Cape Verde Islands.



***Ocypode cursor* (Linnaeus, 1758)**

**Frequent synonyms / misidentifications:** *Ocypode (h)ippeus* Olivier, 1807 / None.

**FAO names:** En – Tufted ghost crab; Fr – *Ocypode pénicillée*; Sp – Capuco de mechon.



**Diagnostic characters:** Body squarish, slightly narrowing posteriorly; upper surface slightly convex, evenly granular with some grooves. Front less than half as wide as the orbits and without spines; carapace widest at anterior margin formed by the orbits and the front; anterolateral margins without teeth behind the outer orbital angle; **eyes slender, in adults ending in a tuft of long hairs, like a paint brush.** **Walking legs are slender, lower surface of the dactylus of third leg densely and shortly pubescent.** **Colour:** yellowish, sometimes orangish or sand coloured.

**Size:** Maximum carapace length 4.6 cm, carapace width 5.5 cm.

**Habitat, biology, and fisheries:** Lives on sandy beaches, making burrows above the high water line. No special fishery. Probably caught by hand, baited traps, cast nets, nooses, etc. Probably consumed cooked, like *Ocypode africana*, but the only positive record of the utilization of the species as food known to the author is the remark by Monod (1928) that this species and *O. africana* are too small to be eaten in the usual way, but that they can be used for the preparation of a tasty soup (potage au tourlourou).

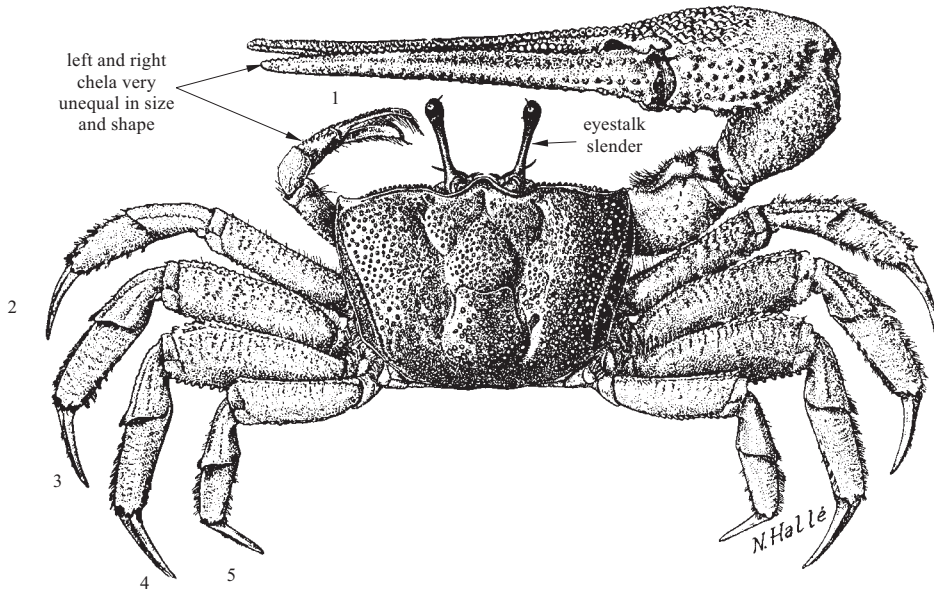
**Distribution:** East Atlantic: southern Mauritania to northern Namibia. Mediterranean: eastern part, Egypt, Israel, Lebanon, Syria and Turkey.



***Uca tangeri* (Eydoux, 1835)**

**Frequent synonyms / misidentifications:** *Uca (Afruca) tangeri* (Eydoux, 1835) / None.

**FAO names:** **En** – West African fiddler crab; **Fr** – Gelasime africain; **Sp** – Violinista africano.



**Diagnostic characters:** Carapace quadrangular, the anterior margin being widest, the lateral margins straight and converging posteriorly; dorsal surface with distinct granules and some grooves. Front short and narrow, triangular, without teeth; lateral margins also lacking teeth; **eyes slender, orbits occupying entire anterior margin at either side of front.** Chelipeds in females small and equal, **with spoon-shaped tips; in males only 1 cheliped small like that of females, other very large, pincers alone being more than twice as long as carapace,** with long and gaping fingers; walking legs similar in shape, but somewhat different in size. **Colour:** carapace grey with a purplish or yellowish tinge; large cheliped of the male purplish at base, the pincers white or partly yellowish.

**Size:** Maximum carapace length 3.3 cm, carapace width 4.7 cm.

**Habitat, biology, and fisheries:** In marsh land, mud flats, often near river mouths, living in burrows dug into the muddy ground. No special fishery. Caught by hand. In Spain and Portugal the large chelipeds are broken off the males and sold cooked or fresh on the markets. Irvine (1947, *Fishes and Fisheries of the Gold Coast*: 288) mentioned that in Ghana the species “is very seldom eaten”. For Cameroon, Monod (1928, *L'industrie des pêches au Cameroun*: 123) remarked that local inhabitants do not collect this species which could, however, constitute an excellent product.

**Distribution:** East Atlantic: Morocco to southern Angola including the Cape Verde Islands; northwards extending to Portugal.



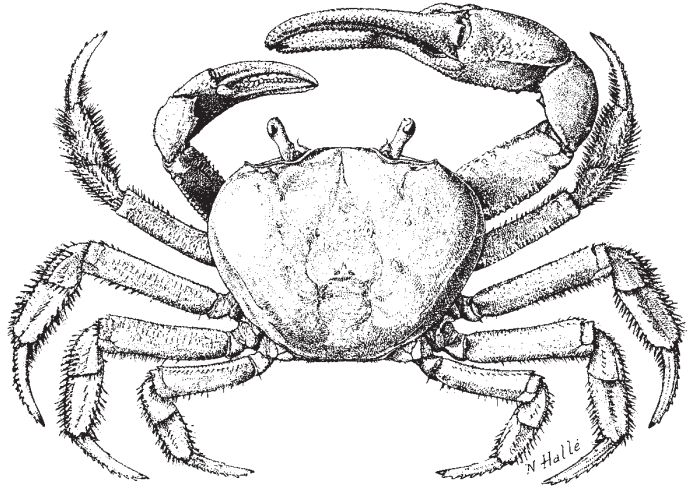
## Superfamily GRAPSOIDEA

### GECARCINIDAE

#### Land crabs

**D**iagnostic characters: Carapace circular or transversely oval, not strongly depressed, dorsal surface smooth, strongly convex longitudinally and transversely, anterolateral margins strongly arched, not divided into teeth or lobes; front wider than length of eyes, without teeth. Rhomboidal gap present between third maxillipeds. Posterior 4 pairs of legs similar, stout, their dactyls longitudinally ridged, ridges with rows of distinct spines. All male abdominal segments distinct, movable.

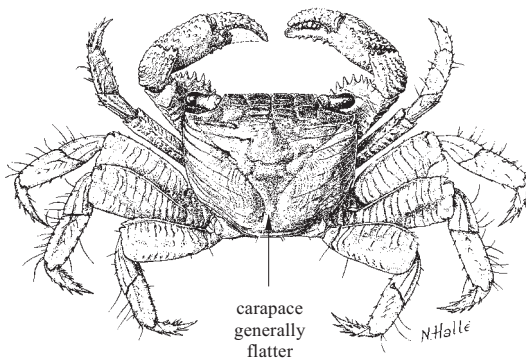
**Habitat, biology, and fisheries:** Adapted to life on land, living in burrow at places where the burrows can reach saline ground waters which can be many kilometres inland. They have to return to the sea to spawn and release their planctonic larvae. Caught with traps or removed from their burrows. The only collected species for consumption is *Cardisoma armatum*.



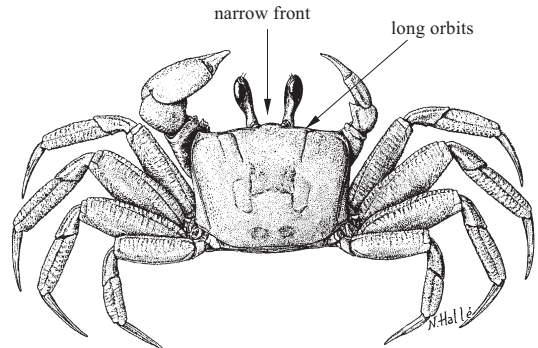
#### Similar families occurring in the area

**Grapsidae:** also have a gap between the third maxillipeds, but most species possess a much flatter dorsal carapace surface compared to gecarcinids.

**Ocypodidae:** also have terrestrial members in the area, but lack the rhomboidal gap between the third maxillipeds and generally do not have as thick a shell as seen in gecarcinids. The front is narrow and the orbit long.



**Grapsidae**

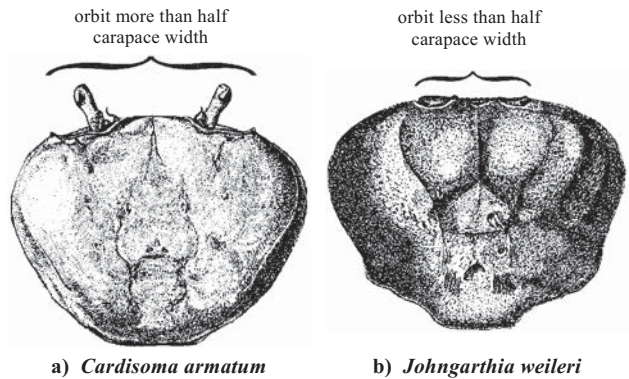


**Ocypodidae**

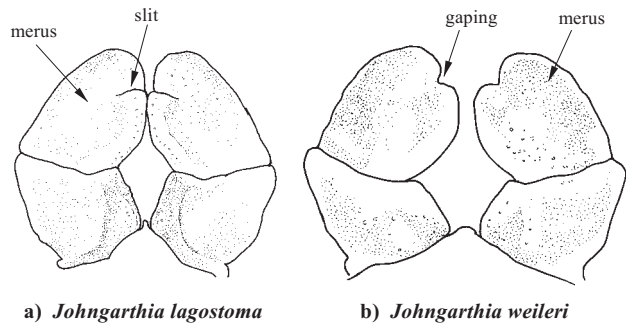


**Key to the genera and species of Gecarcinidae occurring in the area**

- 1a. Front more than half the carapace width (Fig. 1a)  
 . . . . . ***Cardisoma armatum***
- 1b. Front less than half the carapace width (Fig. 1b) . . . . → 2
- 2a. Fissure of merus of third maxilliped a slit, situated in middle of median margin (Fig. 2a)  
 . . . . . ***Johngarthia lagostoma***
- 2b. Fissure of merus of third maxilliped gaping, situated anteromedially (Fig. 2b) . . . ***Johngarthia weileri***



**Fig. 1 carapace**



**Fig. 2 third maxillipeds**

**List of species occurring in the area**

The symbol is given when species accounts are included.

- Cardisoma armatum* Herklots, 1851.
- Johngarthia lagostoma* (H. Milne Edwards, 1837) [Ascension].
- Johngarthia weileri* (Sendler, 1912).

**References**

**Holthuis, L.B.** 1981. True Crabs. In W. Fischer, G. Bianchi & W.B. Scott, eds. *FAO species identification sheets for fishery purposes, Eastern Central Atlantic; Fishing Areas 34, 47 (in part)*. Rome, FAO. Vol. VI: pag.var.

**Manning R.B. & Holthuis, L.B.** 1981. West African brachyuran crabs (Crustacea: Decapoda). *Smithsonian Contributions to Zoology*, 306: 1–379.

**Monod, T.** 1956. Hippidea et Brachyura ouest-africains. *Mémoires de l'Institut Français d'Afrique Noire*, 45: 1–674.

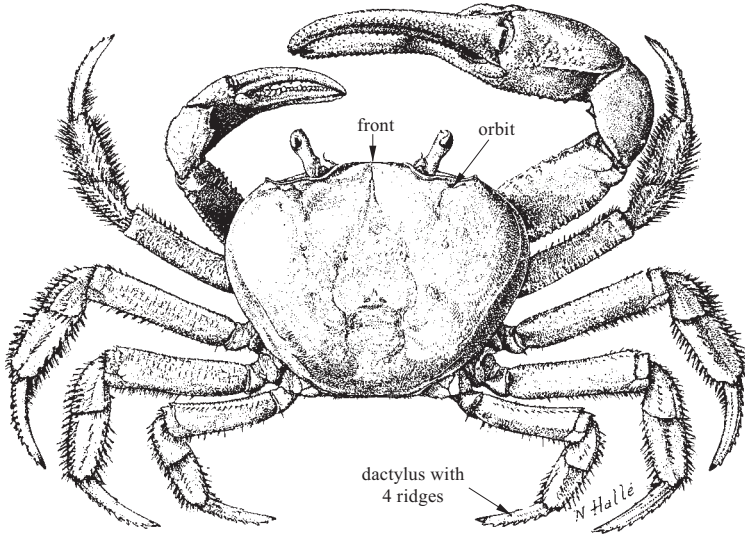
**Ng, P.K.L., Guinot, D. & Davie, P.J.F.** 2008. Systema Brachyurorum: Part I. An annotated checklist of extant brachyuran crabs of the world. *The Raffles Bulletin of Zoology*, supplement 17: 1–286.

**Türkay, M.** 1973. Die Gecarcinidae Afrikas. *Senckenbergiana biologia*, 54(1/3): 81–103.

*Cardisoma armatum* (Herklots, 1851)

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

**FAO names:** **En** – Lagoon land crab; **Fr** – Tourlourou des lagunes; **Sp** – Moro de laguna.



**Diagnostic characters:** Carapace somewhat heart-shaped, broadest in the anterior part, narrowing posteriorly; surface slightly convex and smooth, apart from some faint grooves; lateral margins not sharply defined, without teeth, except for outer orbital angle. **Front** slightly broader than the orbits, **trapezoid, evenly narrowing anteriorly**, without teeth; **fronto-orbital width (space between the outer orbital angles) three-fourths to two-thirds of the greatest carapace width**. Chelipeds distinctly unequal in large specimens, fingers meeting at the tips only; walking legs with short bundles of dark hairs; **dactyls with 4 ridges, each bearing a row of spines**. Third maxilliped with palp and exopod visible. **Colour:** large specimens are dirty orange-brown or yellowish with blue and red hues on the dorsal surface of body and chelipeds. In some specimen the carapace and upper part of the chelipeds may be bluish, the lower surface of the chelipeds and the walking legs more reddish.

**Size:** Maximum carapace length 9.5 cm and carapace width 12 cm (adult males).

**Habitat, biology and fisheries:** The species is terrestrial and lives in burrows in marshy ground near lagoons, but also on higher ground as long as the burrows can reach the saline ground water. These terrestrial animals are caught wherever they occur. The animals are taken with bated traps (usually kerosene cans dug into the ground), with nooses or by removing them from their burrows (by digging them out, by chasing them out or pouring lye in the burrows, or by pulling them out). Caught for private consumption or sold in local markets. Eaten boiled or fried, and widely used as food throughout their range, both by the native population and, to a smaller degree, by Europeans.

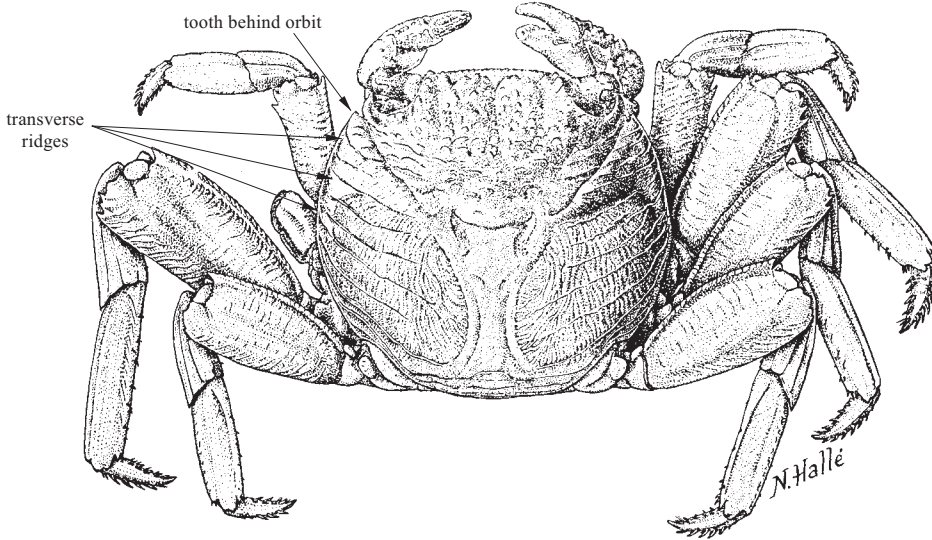
**Distribution:** West Africa from the Cape Verde Islands and Senegal to Angola, including the islands in the Gulf of Guinea.



**GRAPSIDAE**

**Lightfoot crabs, marsh crabs, matchbox crabs**

**D** **Diagnostic characters:** Carapace quadrangular or round, dorsally often with transverse ridges. Front broader than eyes, usually without teeth, if teeth or lobes are present these are even in number. Ventral margin of orbit runs downwards toward buccal cavity. **Anterolateral margin of carapace with at most 2 teeth behind orbit.** Pterygostomial region may be setose but no network-like pattern discernible. **Rhomboidal gap between third maxillipeds with mandibles exposed, merus and ischium of third maxillipeds without hairy oblique ridge;** posterior 4 pairs of legs similar, their dactyli with conspicuous spines. Male abdomen occupying all space between bases of fifth legs.

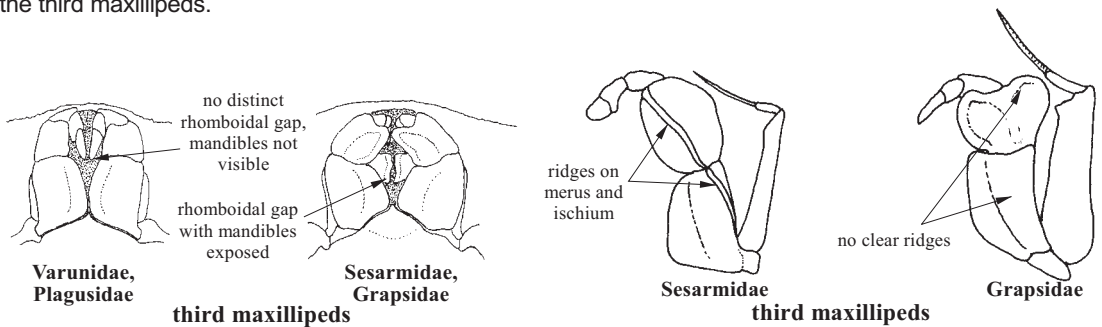


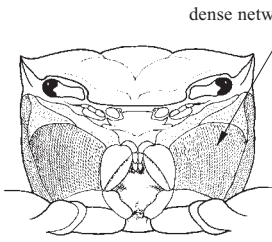
**Habitat, biology, and fisheries:** Members of the family are typically inhabitants of the litoral zone. They can be swimming, climbing or terrestrial. Species occur in rocky areas or estuarine waters, few are associated with floating objects (*Planes*). Twelve species of Grapsidae are recorded for the area of which 3 are of minor interest to fisheries.

**Similar families occurring in the area**

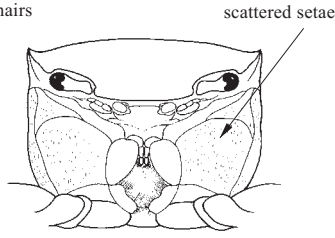
Several other families within the superfamily Grapsoidea are present in the area.

**Sesarmidae:** the rhomboidal gap between the third maxillipeds is also present in this family. It differs in having the merus and ischium of the third maxillipeds with a ridge and the pterygostomial region with a network-like (reticulated) pattern of very short, stiff setae. **Plagusiidae and Varunidae:** No rhomboidal gap present between the third maxillipeds.

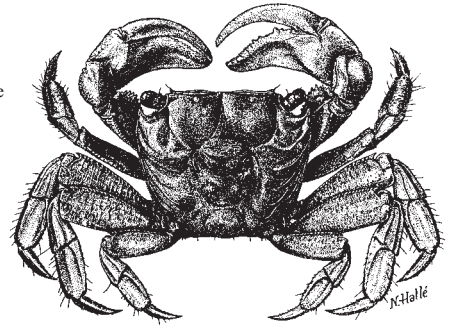




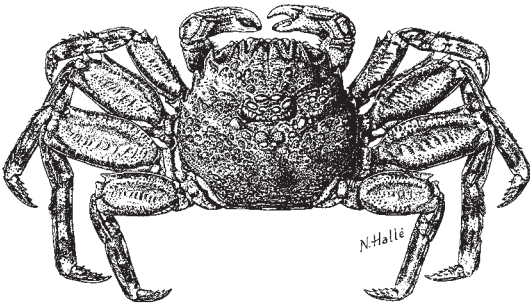
**Sesarmidae**



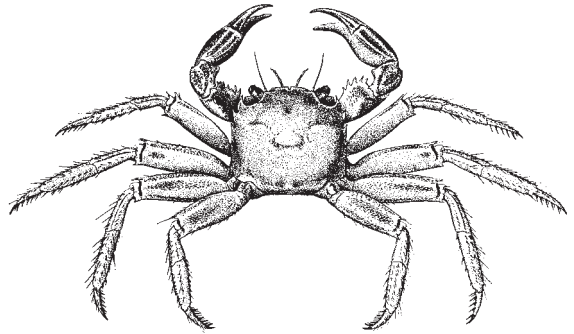
**Grapsidae**



**Sesarmidae**



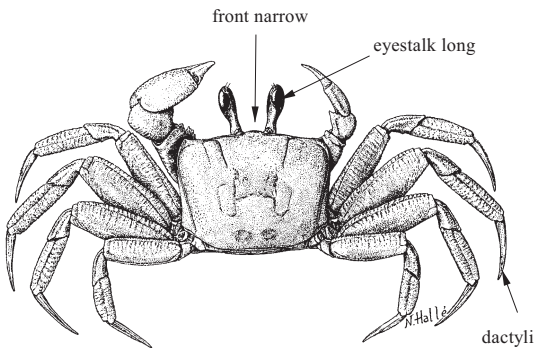
**Plagusidae**



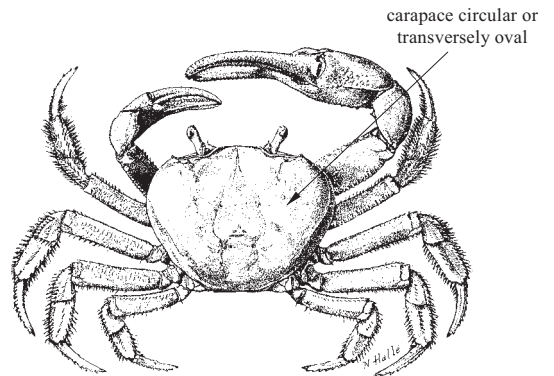
**Varunidae**

Ocypodidae: carapace usually rectangular or nearly so; front narrow; orbits occupying whole anterior border outside front; eyestalks long; posterior 4 legs with dactyli smooth or ridged but not conspicuously spinous.

Gecarcinidae: carapace circular or transversely oval, not strongly depressed, dorsal surface smooth, anterolateral margins strongly arched, not divided into teeth or lobes. Rhomboidal gap present between third maxillipeds.



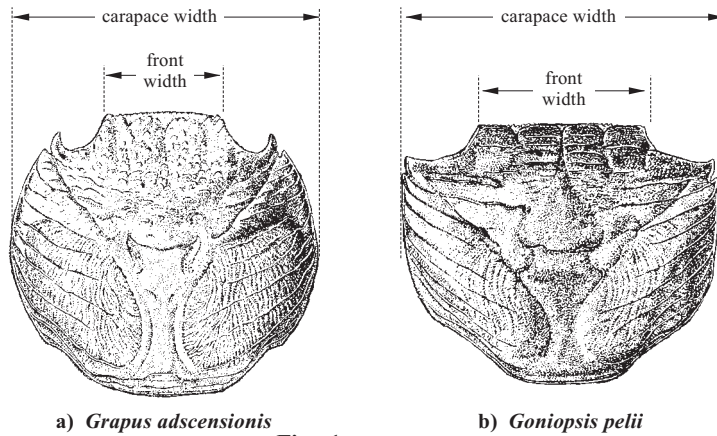
**Ocypodidae**



**Gecarcinidae**

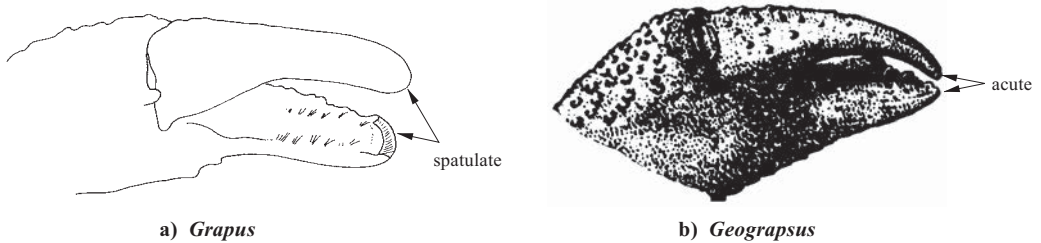
**Key to the genera and species of Grapsidae occurring in the area**

- 1a. Front less than half width of carapace (Fig. 1a) . . . . . → 2
- 1b. Front more than half width of carapace (Fig. 1b) . . . . . → 3



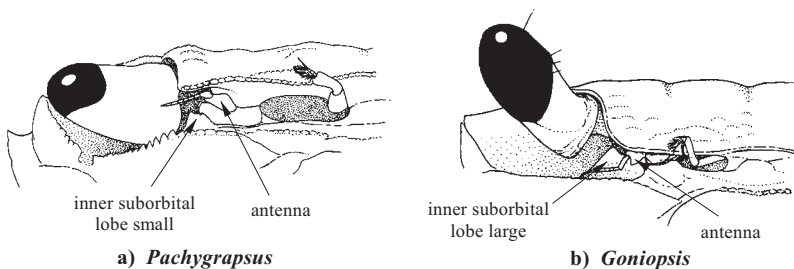
**Fig. 1 carapace**

- 2a. Fingers of chela distally excavate, spatulate (Fig. 2a) . . . . . *Grapsus adscensionis*
- 2b. Fingers of chela distally acute, not spatulate (Fig. 2b) . . . . . *Geograpsus lividus*



**Fig. 2 claw**

- 3a. Antenna entering orbit, inner suborbital lobe small (Fig. 3a) . . . . . → 4
- 3b. Antenna excluded from orbit, inner suborbital lobe large (Fig. 3b) . . . . . *Goniopsis pelii*



**Fig 3 front (anterior view)**

- 4a. Carapace about as broad as long, dorsal surface of carapace almost smooth, without transverse grooves or ridges (lateral striae present in *Planes marinus*), anterolateral tooth small, not acutely pointed; walking legs strongly fringed with hairs; small animals on floating objects (Figs 4 to 6) . . . . . (*Planes*) → 5
- 4b. Carapace decidedly broader than long, dorsal surface of carapace with transverse grooves and ridges, anterolateral tooth distinct, acute; walking legs weakly fringed with hairs (Figs 7 to 12) . . . . . (*Pachygrapsus*) → 7

5a. Lateral margin of carapace convex, surface of branchial regions faintly striate (Figs 5 and 6) . . . . . → 6

5b. Lateral margin of carapace straight, surface of branchial regions distinctly striate (Fig. 4) . . . . . ***Planes marinus***

6a. Propodus of last walking leg about 2 times as long as maximum width (Fig. 5) . . ***Planes minutus***

6b. Propodus of last walking leg about 1.6 times as long as maximum with (Fig. 6) . . . . ***Planes major***

branchial region distinctly striate

lateral margin straight

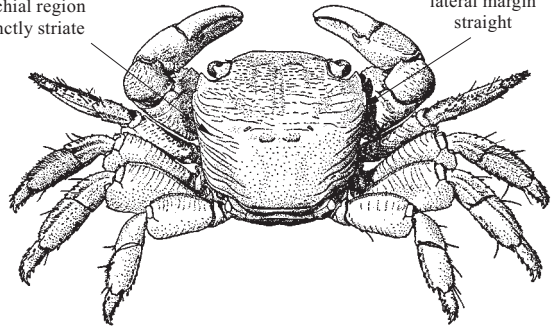


Fig. 4 *Planes marinus*

lateral margin convex

propodus p5 twice as long as width

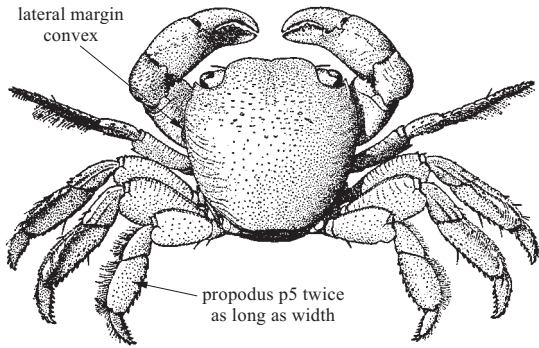


Fig. 5 *Planes minutus*

lateral margin convex

propodus p5 1.6 times as long as width

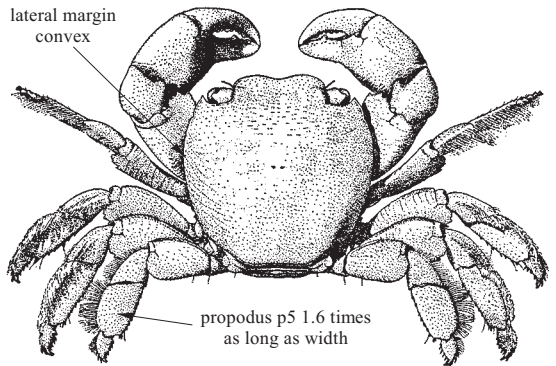


Fig. 6 *Planes major*

7a. Anterolateral margins of carapace without teeth (Fig. 7) . . . . . ***Pachygrapsus corrugatus***

7b. Anterolateral margins of carapace with 1 or 2 teeth behind exorbital angle (Figs 8 and 9) . . . . . → 8

8a. Anterolateral margins of carapace with 1 tooth behind exorbital angle (Fig. 9) . . . . . → 9

8b. Anterolateral margins of carapace with 2 teeth behind exorbital angle (Fig. 8) . . . . . ***Pachygrapsus marmoratus***

anterolateral margin without teeth

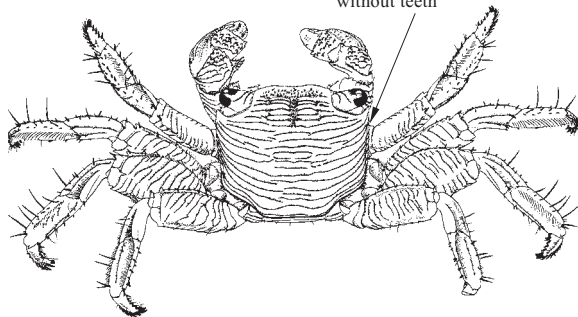


Fig. 7 *Pachygrapsis corrugatus*

anterolateral margin with 2 teeth

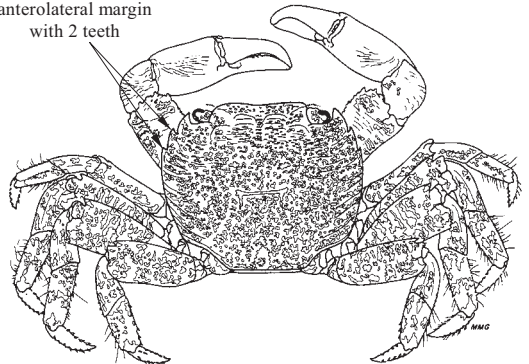


Fig. 8 *Pachygrapsus marmoratus*

- 9a. Posterior margin of merus of last pair of walking legs with apical teeth . . . . . → 10  
 9b. Posterior margin of merus of last pair of walking legs without apical teeth (Fig. 9)  
 . . . . . *Pachygrapsus maurus*

- 10a. Front slightly sinuous, with indistinct notch medially; upper surface of dactylus of pincer smooth . . . . . → 11  
 10b. Front straight; upper surface of dactylus of pincer tuberculate (Fig. 10) . . *Pachygrapsus gracilis*

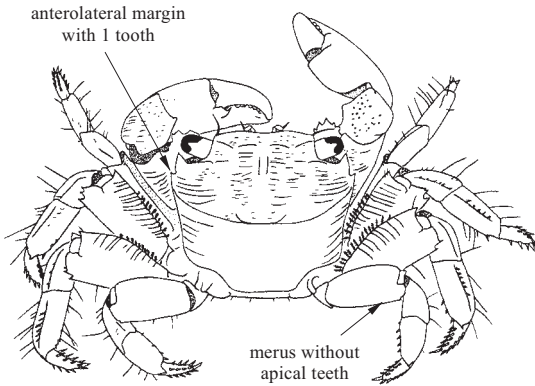


Fig. 9 *Pachygrapsus maurus*

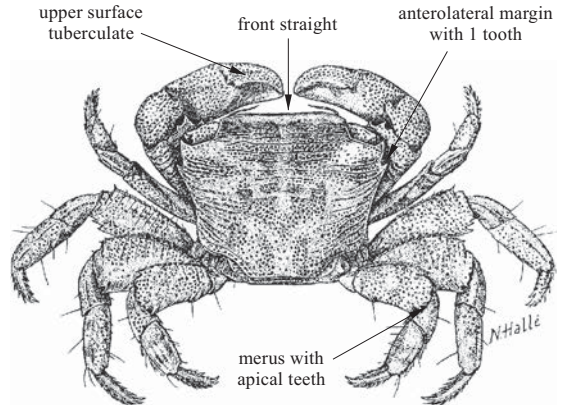


Fig. 10 *Pachygrapsus gracilis*

- 11a. Lower margin of merus of fifth leg entire (Fig. 11) . . . . . *Pachygrapsus transversus*  
 11b. Lower margin of merus of fifth leg with submedian tubercle (Fig. 12) . . *Pachygrapsus loveridgei*

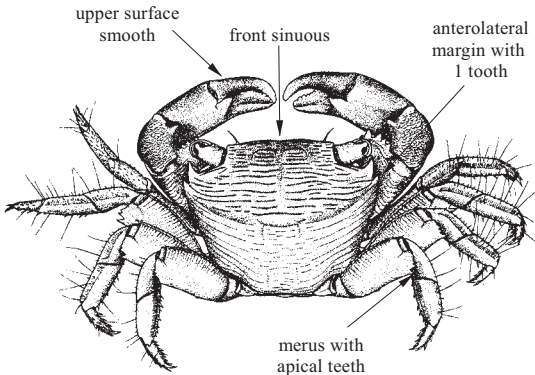


Fig. 11 *Pachygrapsus transversus*

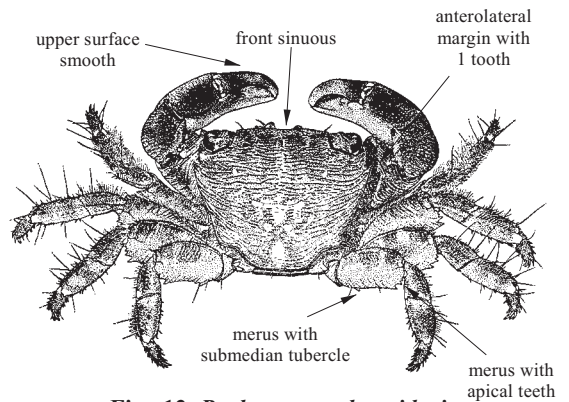




Fig. 12 *Pachygrapsus loveridgei*

### List of species occurring in the area

The symbol  is given when species accounts are included.

*Geograpsus lividus* (H. Milne Edwards, 1837).

 *Goniopsis pelii* (Herklots, 1851).

 *Grapsus adscensionis* (Osbeck, 1765) [Ascension].

*Pachygrapsus corrugatus* (Von Martens, 1872) [Ascension].

*Pachygrapsus gracilis* (De Saussure, 1858).

*Pachygrapsus loveridgei* Chace, 1966 [Ascension].

*Pachygrapsus marmoratus* (Fabricius, 1787).

*Pachygrapsus maurus* (Lucas, 1846).

 *Pachygrapsus transversus* (Gibbes, 1850).

*Planes major* (MacLeay, 1838).

*Planes marinus* Rathbun, 1914 [St. Helena].

*Planes minutus* (Linnaeus, 1758).

### References

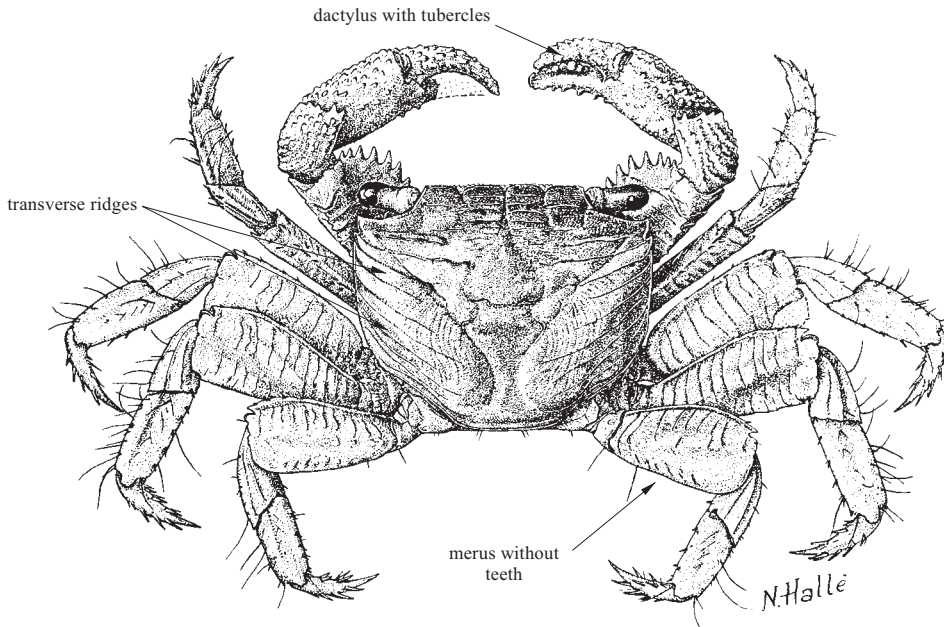
- Holthuis, L.B.** 1981. True Crabs. In W. Fischer, G. Bianchi & W.B. Scott, eds. *FAO species identification sheets for fishery purposes, Eastern Central Atlantic; Fishing Areas 34, 47 (in part)*. FAO, Rome, Vol. VI: pag.var.
- Manning, R.B. & Chace, F.A.** 1990. Decapod and stomatopod Crustacea from Ascension Island, South Atlantic Ocean. *Smithsonian Contributions to Zoology*, 503: 1–91.
- Manning, R.B. & Holthuis, L.B.** 1981. West African brachyuran crabs (Crustacea: Decapoda). *Smithsonian Contributions to Zoology*, 306: 1–379.
- Monod, T.** 1956. Hippidea et Brachyura ouest-africains. *Mémoires de l'Institut Français d'Afrique Noire*, 45: 1–674.
- Ng, P.K.L., Guinot, D. & Davie, P.J.F.** 2008. Systema Brachyurorum: Part I. An annotated checklist of extant brachyuran crabs of the world. *The Raffles Bulletin of Zoology*, supplement 17: 1–286.
- Poupin, J., Davie, P.J.F. & Cexus, J.-C.** 2005. A revision of the genus *Pachygrapsus* Randall, 1840 (Crustacea: Decapoda: Brachyura, Grapsidae), with special reference to the Southwest Pacific species. *Zootaxa*, 1015: 1–66.



***Goniopsis pelii*** (Herklots, 1851)

**Frequent synonyms / misidentifications:** None / *Goniopsis cruentata* sensu Monod, 1956 (non Latreille, 1802).

**FAO names:** En – Purple mangrove crab; Fr – Anglette de mangroves violette; Sp – Abuete real.

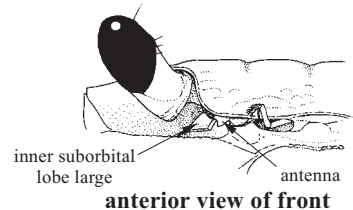


**Diagnostic characters:** Body squarish, **broadest at anterior margin**; anterolateral angles square, posterolateral angles rounded; surface of carapace with distinct transverse ridges. **Front square, more than half as wide as carapace**; eyes at anterolateral corners of carapace. **Antenna separated from orbit by large inner suborbital lobe**. Chelipeds with numerous spines and tubercles, anterior margin of merus with a comb of teeth; walking legs flattened, with ridges and hairs, **dactyls with spines**; **merus of last leg without teeth**; third maxillipeds without an oblique hairy ridge over merus and ischium. **Colour:** carapace purple, with small whitish spots and a striking white streak along the lateral margin. Chela creamy white with a few purple markings. Walking legs purple with yellowish dactyls.

**Size:** Maximum carapace width 4.9 cm, the carapace length to about 4 cm.

**Habitat, biology, and fisheries:** Found in brackish muddy habitats, often in mangrove swamps. No special fishery for the species. It is of very limited commercial importance. Caught locally with artisanal gear. Consumed privately or sold in local markets, mostly fresh. Irvine (1947, *Fishes and Fisheries of the Gold Coast*: 293) mentioned that the species is edible and sold in the fish markets of Ghana. Also in some areas of Nigeria it is eaten (C.B. Powell, in litt.).

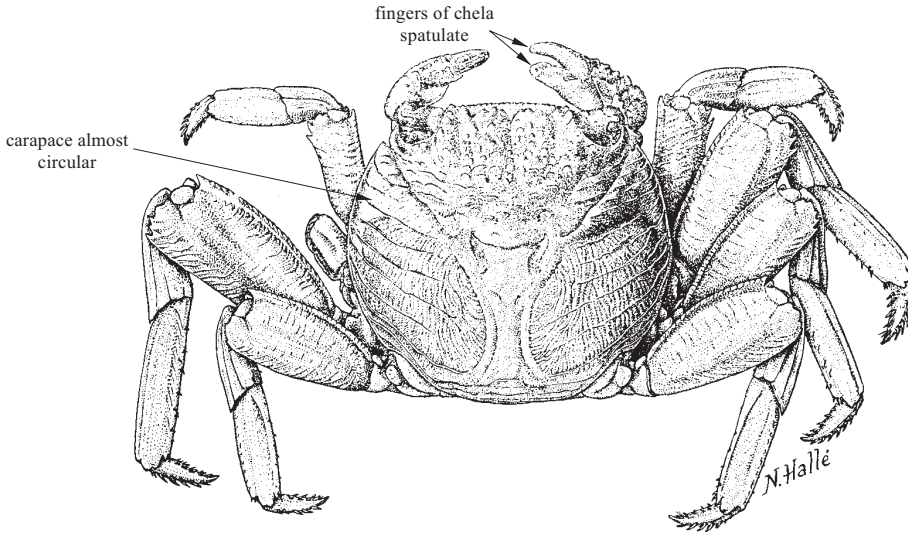
**Distribution:** East Atlantic: Senegal to Angola.



***Grapsus adscensionis* (Osbeck, 1765)**

**Frequent synonyms / misidentifications:** None / *Grapsus grapsus* (Linnaeus, 1758).

**FAO names:** **En** – West African lightfoot crab; **Fr** – Anglette commune d'Afrique occidentale; **Sp** – Abuete negro del África occidental.



**Diagnostic characters:** Carapace in adult specimens almost circular, with front and posterior margins straight, dorsal surface with distinct transverse ridges. Front less than half as wide as carapace and directed downwards, the lower margin convex, the upper 4-lobulate; eyes at anterolateral corners of carapace. Chelipeds with numerous spines and tubercles; finger tips spoon-shaped; walking legs flattened and ridged, dactyls with spines; lower distal angle of merus with teeth except on the last leg; **third maxilliped without an oblique hairy ridge on ischium and merus.** **Colour:** carapace reddish brown to almost black marbled with spots of white; exposed parts of the walking legs are of about the same colour; outer surface of pincers dark with white tips to the fingers.

**Size:** Maximum carapace width 8.7 cm, carapace length 7.7 cm.

**Habitat, biology, and fisheries:** Lives near the water line on rocks and is very active on land, taking refuge in the sea when danger threatens. No special fishery. Apparently utilized mainly for private consumption. According to Irvine (1947, Fishes and Fisheries of the Gold Coast: 291) it is caught in Ghana by means of circular cast-nets. No other records that the species is eaten in West Africa are available.

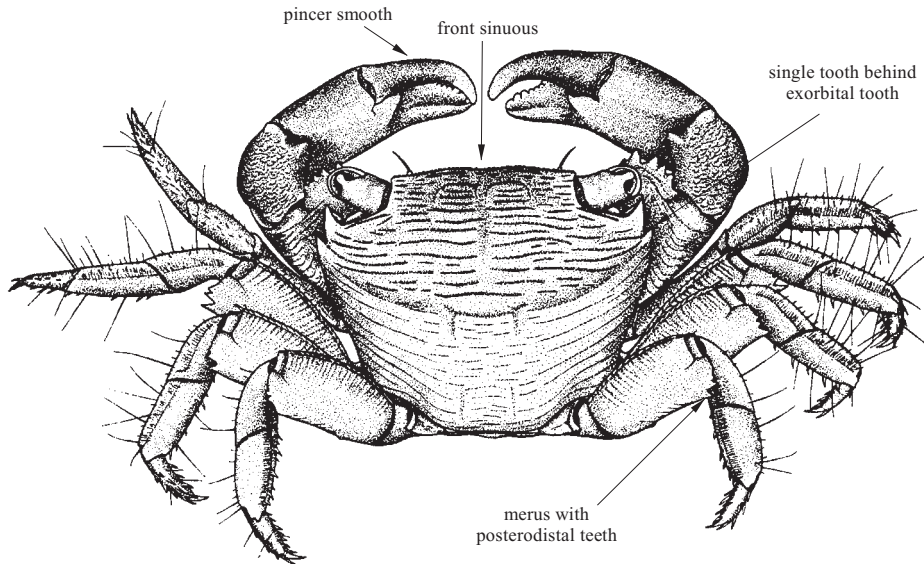
**Distribution:** East Atlantic: Morocco to Namibia, including the Cape Verde Islands, islands of the Gulf of Guinea, Ascension and St Helena. Manning and Chace (1990) separated the West and East Atlantic populations of *Grapsus* in different species. All East Atlantic records of *Grapsus grapsus* (Linnaeus, 1758) refer to *Grapsus adscensionis*.



***Pachygrapsus transversus*** (Gibbes, 1850)

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

**FAO names:** **En** – African matchbox crab; **Fr** – Anglette africaine; **Sp** – Abuete cajeta.



**Diagnostic characters:** A small crab; carapace slightly convex, with transverse ridges dorsally, broadest anteriorly, narrowing posteriorly, trapezoid in outline. **Front with sinuous anterior margin, its width distinctly greater than half that of carapace; lateral margin with a single tooth behind exorbital tooth. Pincers smooth without tubercles or spines**, but with faint ridge on outer margin; first walking leg with a tuft of whitish hairs on anterior surface of propodus; **merus of all walking legs with teeth at posterodistal angle.** **Colour:** brown variegated with green and yellowish.

**Size:** Maximum carapace length 1.5 cm, carapace width to 1.8 cm.

**Habitat, biology, and fisheries:** Intertidal to 7 m depth. Among rocks, on sandy beaches and in mangroves. No special fishery for the species. Caught by hand. Marketed fresh, it is of very little commercial importance. The only mention of its economic value known to the author is by Irvine (1947, *Fishes and Fisheries of the Gold Coast*: 292), who stated that in Ghana, "notwithstanding its very small size the species appears to be used as food"; Irvine obtained material at the fish market of Accra.

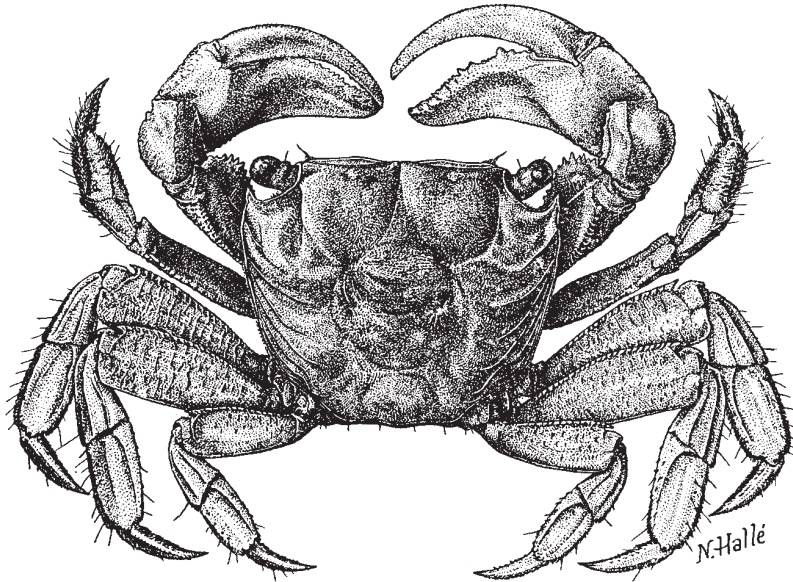
**Distribution:** East Atlantic: South Portugal to Namibia, including Madeira, Canary Islands and Cape Verde Islands. Mediterranean: Alboran Sea to Levant basin. West Atlantic: Cape Cod to Montevideo, including the Caribbean and Bermuda. East Pacific: Lower California to Peru, including the oceanic island groups of Revillagigedo, Clipperton and the Galápagos.



**SESARMIDAE**

**Sesarmid mangrove crabs**

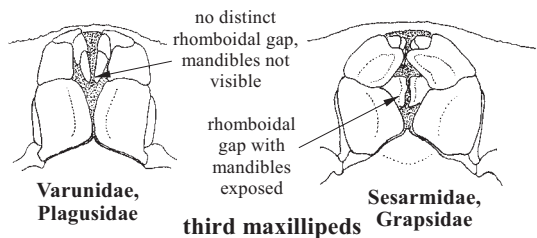
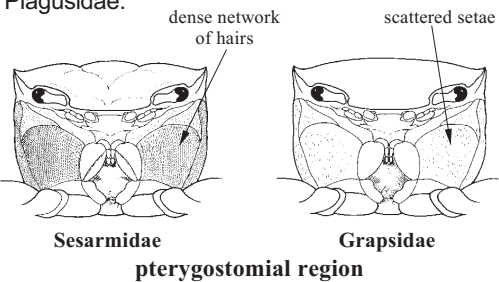
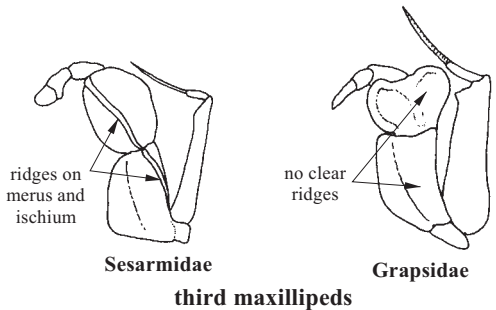
**D** **Diagnostic characters:** Carapace usually quadrangular, often with oblique or transverse ridges. Front broader than eyes, usually without teeth, if teeth or lobes are present these are even in number. Ventral margin of orbit runs downwards toward buccal cavity. **Anterolateral margin of carapace with at most 2 teeth behind orbit. Pterygostomial region with network-like pattern of very short stiff setae. Rhomboidal gap between third maxillipeds with mandibles exposed, merus and ischium of third maxillipeds with oblique ridge;** posterior 4 pairs of legs similar, their dactyli with conspicuous spines. Male abdomen occupying all space between bases of fifth legs.



**Habitat, biology, and fisheries:** Semiterrestrial, typical inhabitants of soft-sediment littoral habitats like marshes and mangroves. Of minor commercial importance. Only 1 species, *Chiromantes angolense*, known to be of minor commercial interest in the area.

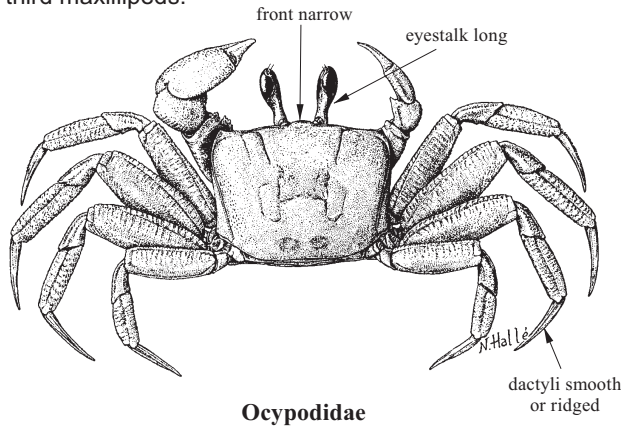
**Similar families occurring in the area**

Several other families within the superfamily Grapsoidea are present in the area. The Grapsidae, Varunidae and Plagusidae do not have the ridge on the merus and ischium of the third maxilliped and have not reticulated pterygostomial region. The Grapsidae have the rhomboidal gap of the third maxillipeds in common with the Sesarmidae, this gap is lacking in the Varunidae and Plagusidae.

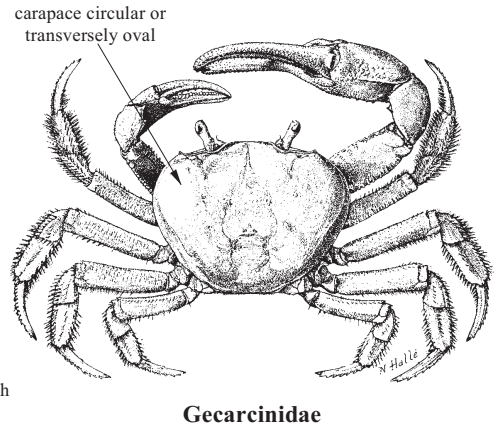


Ocypodidae: front narrow; orbits occupying whole anterior border outside front; eyestalks long; posterior 4 legs with dactyli smooth or ridged.

Gecarcinidae: carapace circular or transversely oval, not strongly depressed, dorsal surface smooth, anterolateral margins strongly arched, not divided into teeth or lobes. Rhomboidal gap present between third maxillipeds.



Ocypodidae



Gecarcinidae

**Key to the species of Sesarmidae occurring in the area**

- 1a. Anterolateral margin with 2 teeth; lateral margins convex; maximum width in middle of carapace (Fig. 1) . . . . . ***Metagrapsus curvatus***
- 1b. Anterolateral margins with 1 or without tooth; lateral margins straight; maximum width of carapace in front (Figs 2 and 3) . . . . . → 2
- 2a. One anterolateral tooth behind the exorbital tooth (Fig. 2); palm with oblique pectinations on superior surface (Fig. 5) . . . . . → 3
- 2b. No anterolateral tooth behind exorbital tooth (Fig. 3); palm without pectinations . . . . . → 5

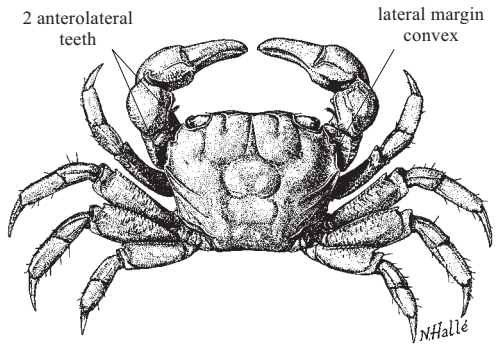


Fig. 1 *Metagrapsus curvatus*

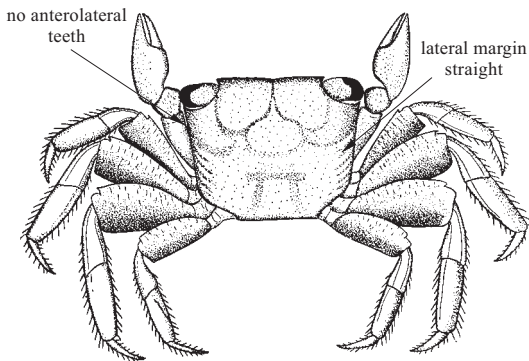


Fig. 2 *Chiromantes buettikoferi*

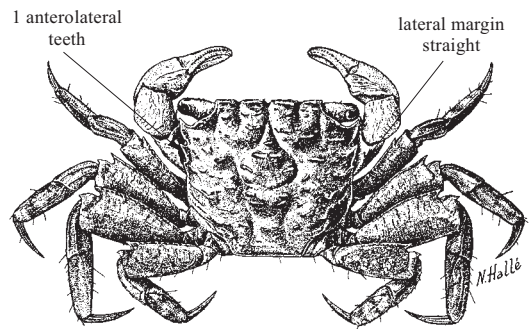


Fig. 3 *Perisesarma alberti*

- 3a. External surface of palm flat with a tubercle at the proximo-inferior angle (Fig. 4) . . . . . ***Perisesarma kamermani***
- 3b. External surface of palm convex . . . . . → 4
- 4a. Stridulation organ on dactylus of chela composed of about 15 short, oblique, ridges surrounded by granules (Fig. 5a) . . . . . ***Perisesarma huzardi***
- 4b. Stridulation organ on dactylus of chela with 30 fine oblique ridges not surrounded by granules (Fig. 5b) . . . . . ***Perisesarma alberti***

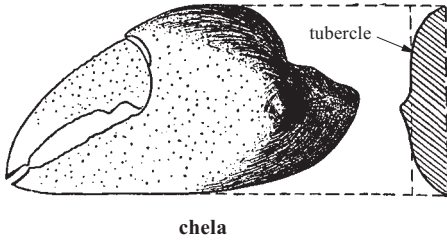
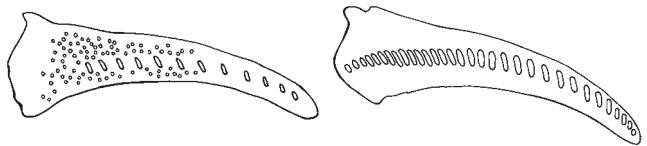


Fig. 4 *Perisesarma kamermani*



a) *Perisesarma huzardi*      b) *Perisesarma alberti*

Fig. 5 superior margin dactylus of chela

- 5a. Palm extending laterally beyond carpal articulation in males (Fig. 6), external surface flattened . . . . . ***Chiromantes buettikoferi***
- 5b. Palm not extending laterally beyond carpal articulation (Fig. 8), external surface convex . . . . . → 6

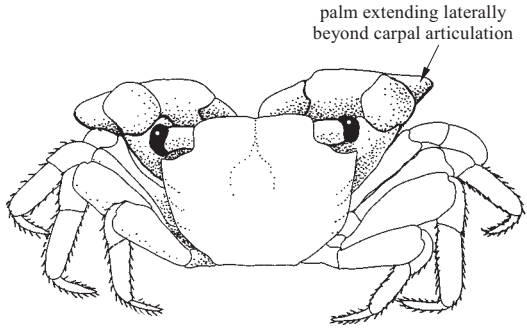


Fig. 6 *Chiromantes buettikoferi*

- 6a. Walking legs slender, propodus twice as long as dactylus, with margins parallel (Fig. 7) small species, 18 x 18 mm . . . ***Armases elegans***
- 6b. Walking legs robust, propodus as long as dactylus, with margins convex (Fig. 8); moderately sized species, 37 x 44 mm . . . . . ***Chiromantes angolense***

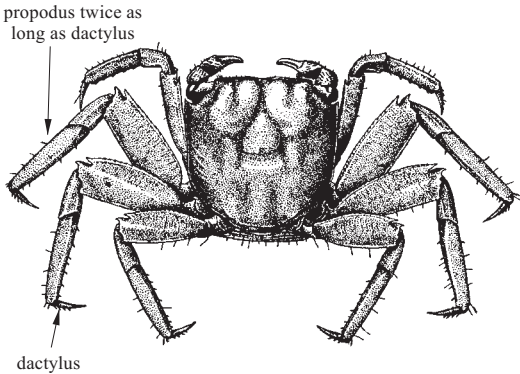


Fig. 7 *Armases elegans*

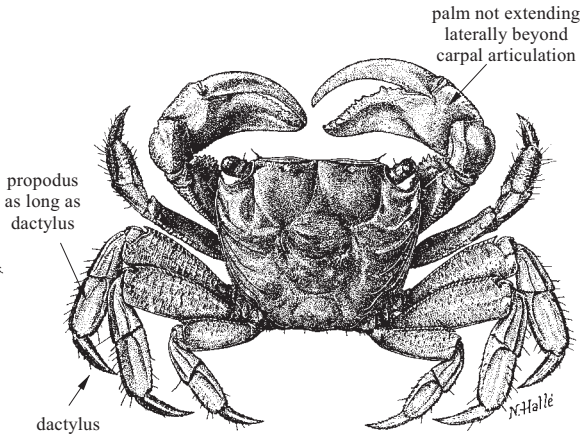




Fig. 8 *Chiromantes angolense*

**List of species of occurring in the area**

The symbol  is given when species accounts are included.

*Armases elegans* (Herklots, 1851)

 *Chiromantes angolense* (de Brito Capello, 1865).

*Chiromantes buettikoferi* (De Man, 1883).

*Metagrapsus curvatus* (H. Milne Edwards, 1837).

*Perisesarma alberti* (Rathbun, 1921).

*Perisesarma huzardi* (Desmarest, 1825).

*Perisesarma kamermani* (De Man, 1883).

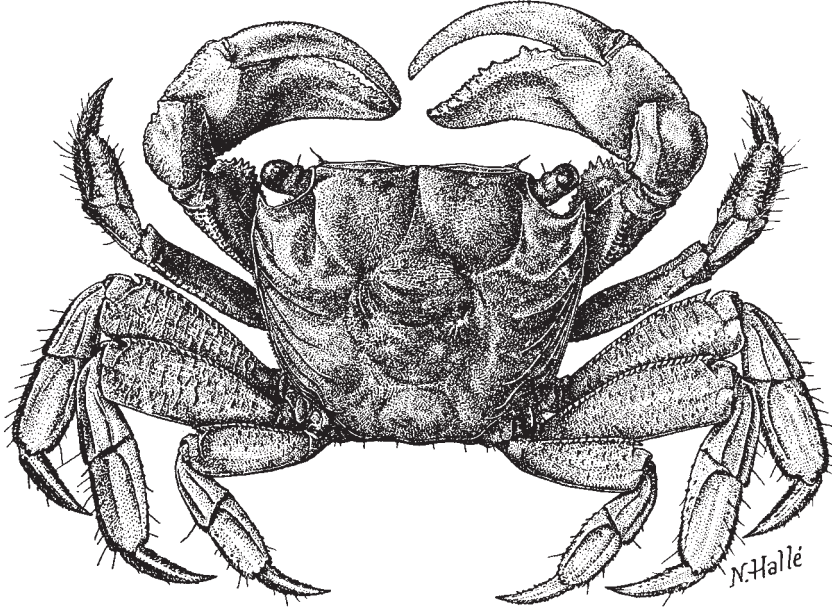
**References**

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- Manning R.B. & Holthuis, L.B.** 1981. West African brachyuran crabs (Crustacea: Decapoda). *Smithsonian Contributions to Zoology*, 306: 1–379.
- Monod, T.** 1956. Hippidea et Brachyura ouest-africains. *Mémoires de l'Institut Français d'Afrique Noire*, 45: 1–674.
- Ng, P.K.L., Guinot, D. & Davie, P.J.F.** 2008. Systema Brachyurorum: Part I. An annotated checklist of extant brachyuran crabs of the world. *The Raffles Bulletin of Zoology*, supplement 17: 1–286.

***Chiromantes angolense* (de Brito Capello, 1865)**

**Frequent synonyms / misidentifications:** *Sesarma angolense* de Brito Capello, 1864 / None.

**FAO names:** **En** – Angola marsh crab; **Fr** – Anglette angolaise; **Sp** – Abuete de Angola.



**Diagnostic characters:** Body robust and high, squarish in outline, narrowing only slightly posterior; upper surface scabrous by presence of small granules, but without tufts of short, stiff, black hairs; few oblique ridges laterally; **lateral margin without teeth behind extraorbital tooth**; upper margin of front consisting of single row of granules, indistinctly four-lobed. Upper margin of dactylus of chelipeds granular; immovable finger high, triangular; third maxilliped with distinct oblique, hairy ridge on merus and ischium; walking legs with spinules on dactylus and propodus and rows of short, dark, densely placed hairs; **dactylus almost as long as propodus**. **Colour:** body reddish brown to dark brown; chelipeds becoming lighter distally, with fingers yellowish.

**Size:** Maximum carapace length 3.3 cm, carapace width 4.2 cm.

**Habitat, biology, and fisheries:** Inhabits swamps and mangroves and makes burrows in the muddy ground. No special fishery. Caught by hand. Not used as food, but as bait: "These crabs are not eaten by the natives, but I was told that at times large numbers are crushed and used as bait in certain types of fish traps" (Rathbun, 1921, *Bull. American Mus. nat. Hist.*, 43:452). The author has been unable to find any record of sesarmid species being eaten in West Africa, while there are positive statements that they are not (e.g., for *Perisesarma huzardi* by Irvine, 1947, *Fishes and Fisheries of the Gold Coast*: 294: "The species is not edible").

**Distribution:** East Atlantic: Sierra Leone to Angola.





# CHITONS

**(Amphineura, Loricata, Polyplacophora)**

by J.-M. Poutiers

Département Systématique et Evolution  
Unité Systématique, Adaptation, Evolution  
Équipe Exploration de la Biodiversité (Mollusques)  
Muséum national d'Histoire naturelle  
Paris, France

## GENERAL REMARKS

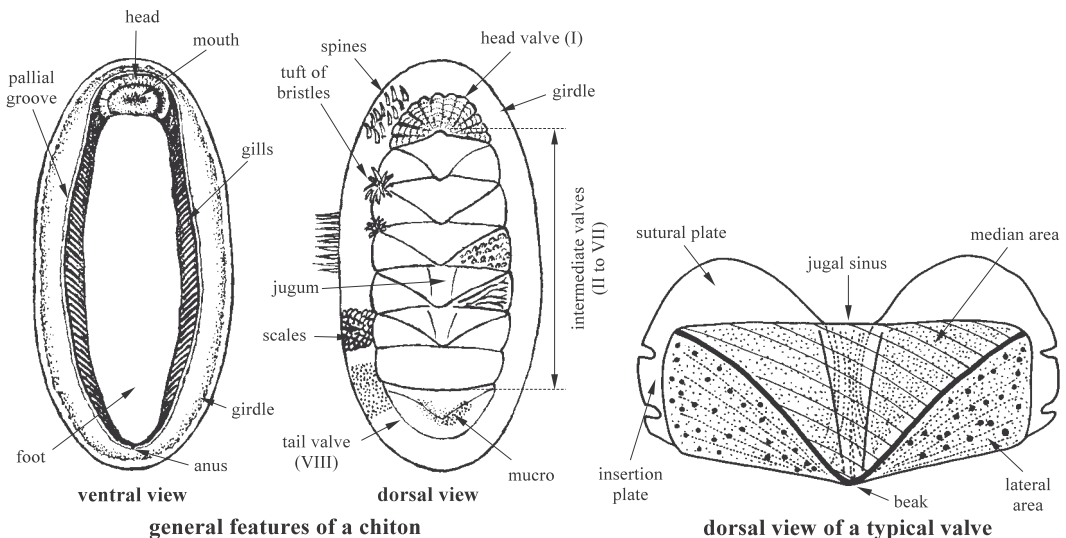
The Polyplacophora, commonly known as chitons or coat-of-mail shells, are bilaterally symmetrical, usually flattened, elongate molluscs. The external mantle bears on its dorsal surface a characteristic **shell** that is divided into a series of 8 arched plates or **valves**. A tough muscular band, called the **girdle**, surrounds the valves and holds them in position. The girdle is a reflexed fold of the mantle tissue, which may partially or even completely cover the valves. It is either naked and leathery, or furnished with calcareous **spines** or **scales**, or with hairy corneous **bristles**.

The valves overlap like tiles of a roof, making the shell highly flexible and allowing the animal to curl up like a woodlouse. The 2 semicircular **end valves** are called the **head valve** (the first, anteriormost valve) which overlaps its successor, and the **tail valve** (the eighth, posteriormost valve), while valves number II to VII are the **intermediate valves**.

The valves have a complex structure composed of 4 main layers. The outermost layer (or **periostracum**) is a very thin organic film which contains most of the pigment. The outer shell layer (or **tegmentum**) is composed of conchyolin impregnated with calcium carbonate and penetrated by many horizontal and vertical canals bearing minute sense organs. The calcareous inner layer (or **articulamentum**) projects on the sides of the valves to form the **insertion plates**, serving to anchor the valves in the girdle; insertion plates are usually divided into insertion teeth by notches (or **insertion slits**). In each valve (except for the head one), the articulamentum also projects anteriorly as 2 blades, the **sutural plates** (also known as the sutural laminae or apophyses), separated by a median sinus (the **jugal sinus**) and which hook beneath the preceding valve to function as a hinge. The fourth, innermost shell layer (or **hypostracum**) is thin and only developed in some regions of the valves.

Shell surface of the head valve is generally undifferentiated. Dorsal surface of the intermediate valves is composed of 2 triangular, usually raised, side areas (the **lateral areas**) flanking the remaining central part (or **median area**). The midline of each intermediate valve often forms a weakly angled ridge (the **jugum**), ending posteriorly in a small **beak** (or **apex**); the surface immediately adjacent to the jugum, when sculptured differently from the rest of the valve surface, forms the **jugal area**. The tail valve is distinguished by a medial projection (or **muicro**), which divides the surface into central, antimucronal and posterior, postmucronal areas.

The soft parts are completely hidden by the shell and girdle. The well-developed and strongly muscular foot makes a ventral creeping sole, quite as large as the under surface of the animal. Anteriorly, there is a poorly defined head region, with a mouth but lacking tentacles or eyes. The digestive system is simple, with a long coiled gut and includes a radula. Most of the organs are symmetrically organized. Gills are numerous and arranged on either sides of the foot, in a pallial groove between the foot and the girdle.



There are about 750 living species of chitons in the world, ranging in length from only 0.6 mm to 360 mm for the massive *Cryptochiton stelleri* (Middendorf, 1847) of northwest America and Japan. The areas of maximum species diversity are Australasia and the tropical American coasts of the eastern Pacific. Most of the chiton species live in clear waters along rocky shores, in the intertidal and shallow sublittoral zones, although a few species are found in the deep seas (down to more than 7 000 m depth). They feed at night or on dark days, grazing mainly on algae or minute particles of plant and animal life. They usually avoid light and return to their previous resting place, to shelter beneath a ledge or inside some protective crevice. Species that live in exposed places have outstanding protective colorations and tightly adhere to the substrate, using their foot to attach by suction. Chitons usually feed on the microflora, algae, seagrasses and small encrusting animals that are scraped from the substrate using the powerful radula. Some species are exclusively carnivorous and usually feed on sedentary animals such as sponges or bryozoans. However, a few species are known to catch moving prey (small crustaceans, annelid worms or brittlestars), using a specialized active habit: the enlarged anterior girdle is raised to catch a passing prey, rapidly lowered to entrap it before it is pushed into the mouth by special tentacles. Chiton's shell is perforated by minute sense organs, some of which are light-sensitive, and sometimes sets of true eyes are present on the valve surface. Sexes are separate and fertilization is external. Eggs are generally laid in jelly-like strings or masses. Hatching occurs as crawling young, or as free-swimming larvae, which spend a few hours or days in the plankton before metamorphosing. Some species brood their eggs in the pallial groove.

Though chitons generally have only limited economic significance, they are collected in some areas of the world, both by coastal peoples for human consumption, and by fish anglers for baiting. Northern and central parts of the studied area seem poor in large-sized and common littoral species of potential economic importance. However, a few littoral species might be considered large enough to be possibly locally collectable, but no data on their possible use is presently available; these species include *Chiton olivaceus* Spengler, 1797 and *Chiton canariensis* d'Orbigny, 1839 of the family Chitonidae, and *Acanthochitona fascicularis* (Linnaeus, 1767) of the family Acanthochitonidae. The species retained in the following contribution occur commonly in the southernmost part of the eastern central Atlantic, as well as along the shores of the nearby South Africa, where they are known to be actively exploited by coastal people, mainly for baiting. However, in view of the paucity of detailed information available on their exploitation, it is probable that other species are collected locally in the studied area.

## GLOSSARY OF TECHNICAL TERMS

**Apex** – See beak.

**Beak** – Post-median extension of the jugum.

**Girdle** – Leathery, muscular extension of the mantle surrounding the valves and partly covering them dorsally, often bearing armature consisting of granules, bristles, scales, spicules or spines.

**Head valve** – Antermost valve (numbered I), rounded in front and lacking sutural plates.

**Insertion plates** – Lateral extensions of the valves, which anchor them in the girdle.

**Insertion teeth and slits** – Divisions of the insertion plates.

**Intermediate valve** – One of the 6 valves between head and tail valves (numbered respectively II to VII, from the head end of the animal).

**Jugal area** – See median area.

**Jugal sinus** – Median interruption of the sutural plates of a valve.

**Jugum** – Dorsal median ridge of an intermediate valve, when present.

**Lateral area** – Posterior, triangular side area of an intermediate valve usually set off from remainder of the upper surface by a diagonal ridge of varying prominence.

**Median area** – Anterior central area of an intermediate valve situated in front of the lateral areas. When a jugum is developed, median area is often divided into a central, jugal area and 2 triangular, pleural areas pointing anterolaterally from the apex.

**Mucro** – Summit of tail valve.

**Pectinate** – With numerous grooves, which gives a comb-like aspect.

**Pleural area** – See median area.

**Sculpture** – Relief pattern developed on the outer surface of the valves.

**Sutural plates** – Portions of tail and intermediate valves projecting beneath the preceding valve.

**Tail valve** – Posteriormost valve (numbered VIII), rounded behind and with sutural plates in front.

**Valve** – One of the 8 shelly plates of a chiton.

**IDENTIFICATION NOTE**

If the aspect of the outer surface is not sufficient to secure the identification of a chiton species, it will be necessary to disarticulate a specimen in order to examine the diagnostic characters of the insertion plates.

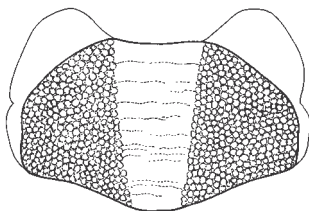
**KEY TO FAMILIES**

Remarks on key characters: features used in this key only apply to species included in the present contribution; they do not consider a few exceptions within the families for species not included here, the inclusion of which would make the key too complex for general use.

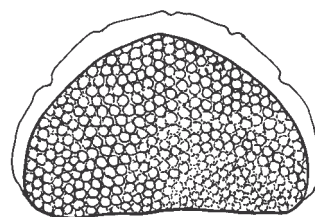
- 1a. Girdle relatively narrow, occupying less than half of the total width; insertion plate of the head valve with 6 or more slits; intermediate valves with distinct lateral and median areas . . . . . → 2
- 1b. Girdle relatively broad, occupying half the total width or more; insertion plate of the head valve with 5 slits; intermediate valves with uniformly sculptured lateropleural areas on both sides of the jugal area . . . . . **Acanthochitonidae**
- 2a. Insertion plates of valves incised by slits and pectinate on their outer margin . . . . . **Chitonidae**
- 2b. Insertion plates of valves incised by slits but not pectinate on their outer margin . . . **Ischnochitonidae**

Note: The following figures contain all the families included in this contribution, including those for which no species accounts are included. These latter families are marked with an asterisk (\*).

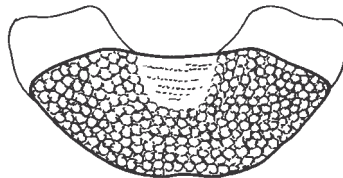
\*Acanthochitonidae: girdle relatively broad, occupying half the total width or more, smooth or spiny but not scaly and often bearing a series of tufts of prominent, erect, glassy bristles. Intermediate valves with well defined jugal area, flanked on both sides by uniformly sculptured lateropleural areas. Insertion plate of the head valve with 5 slits.



dorsal view of intermediate valve

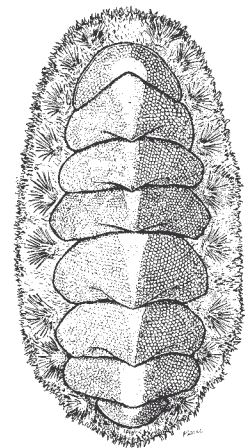


dorsal view of head valve



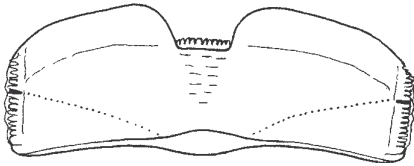
dorsal view of tail valve

**Acanthochitonidae**

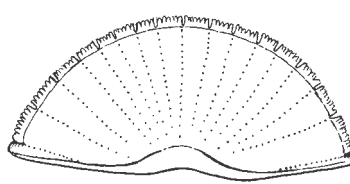


dorsal view

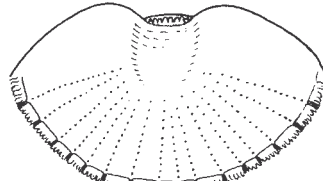
\*Chitonidae: girdle relatively narrow, occupying less than half of the total width, bearing overlapping calcareous scales (rarely smooth). Intermediate valves usually with well marked lateral and median areas. Insertion plates of valves incised by slits and pectinate on their outer margin; insertion plate of the head valve with 6 or more slits.



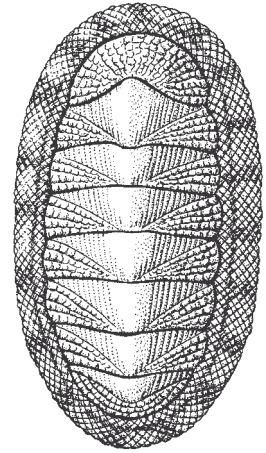
ventral view of intermediate valve



ventral view of head valve



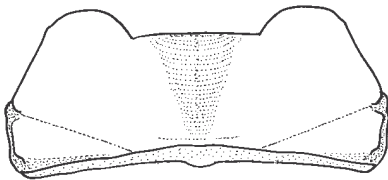
ventral view of tail valve



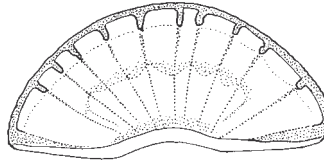
dorsal view

### Chitonidae

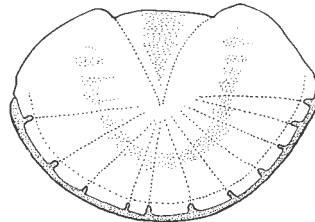
Ischnochitonidae: girdle relatively narrow, occupying less than half of the total width, bearing short, corneous bristles or overlapping calcareous scales. Intermediate valves with distinct lateral and median areas. Insertion plates of valves incised by slits but not pectinate on their outer margin; insertion plate of the head valve with 6 or more slits.



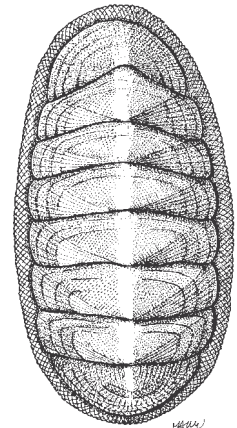
ventral view of intermediate valve



ventral view of head valve



ventral view of tail valve



dorsal view

### Ischnochitonidae

## LIST OF FAMILIES AND SPECIES OF INTEREST TO FISHERIES OCCURRING IN THE AREA

The symbol ● is given when species accounts are included.

### CHITONIDAE

*Chiton canariensis* d'Orbigny, 1839.

*Chiton olivaceus* Spengler, 1797.

### ISCHNOCHITONIDAE

● *Chaetopleura papilio* (Spengler, 1797).

● *Ischnochiton textilis* (Gray, 1828).

### ACANTHOCHITONIDAE

*Acanthochitona fascicularis* (Linnaeus, 1767).

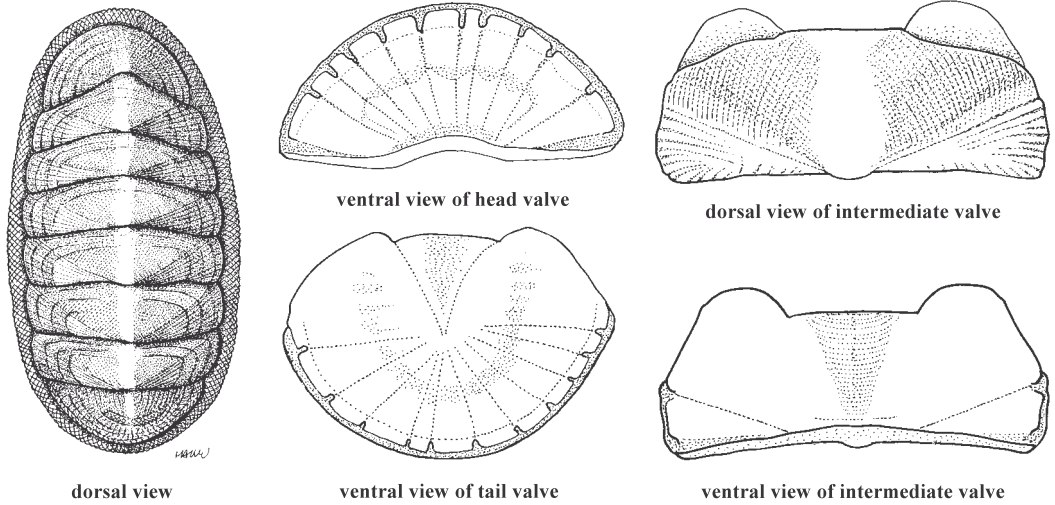
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- Kaas, P. & Van Belle, R.A.** 1985b. *Monograph of Living Chitons (Mollusca: Polyplacophora). Volume 2. Suborder Ischnochitonina: Ischnochitonidae: Schizoplacinae, Callochitoninae, Lepidochitoninae*. Leiden, Brill & Backhuys, 198 pp.
- Kaas, P. & Van Belle, R.A.** 1987. *Monograph of Living Chitons (Mollusca: Polyplacophora). Volume 3. Suborder Ischnochitonina: Ischnochitonidae: Chaetopleurinae and Ischnochitoninae (pars). Additions to Volumes 1 & 2*. Leiden, Brill & Backhuys, 302 pp.
- Kaas, P. & Van Belle, R.A.** 1990. *Monograph of Living Chitons (Mollusca: Polyplacophora). Volume 4. Suborder Ischnochitonina: Ischnochitonidae: Ischnochitoninae (continued). Additions to Volumes 1, 2 & 3*. Leiden, Brill, 298 pp.
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**ISCHNOCHITONIDAE**

**Chitons [Narrow chitons]**

**Diagnostic characters:** Girdle relatively narrow, occupying less than half of the total width, bearing short corneous bristles or overlapping calcareous scales. Outer surface of the shell variously sculptured, rarely smoothish. Lateral areas of intermediate valves usually well marked. All valves with short insertion plates, which are usually incised by slits, but not pectinate on their outer margin; insertion plate of the head valve with 6 or more slits. Sutural plates well developed on intermediate and tail valves.

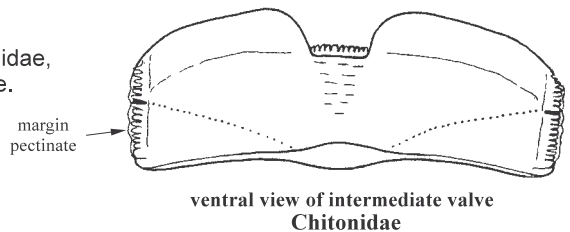


**Ischnochitonidae**

**Habitat, biology, and fisheries:** Slow-moving animals, common on rocks or under stones of the intertidal and shallow subtidal zones, grazing on algae, diatoms, hydroids, bryozoa, or even small barnacles. Locally collected by coastal people, for human consumption or for baiting.

**Similar families occurring in the area**

Chitonidae: shell similar to that of Ischnochitonidae, but outer margin of the insertion plates pectinate.



**ventral view of intermediate valve  
Chitonidae**

**Key to the species of interest to fisheries occurring in the area**

- 1a. Girdle leathery, with stiff bristles; shell valves steeply arched, with polished surface and faint sculpture of very fine grooves (median area) and feeble threads with tiny sparse granules (lateral areas); insertion plates with 1 slit on each side of intermediate valves and with 9 to 11 slits on head valve . . . . . ***Chaetopleura papilio***
- 1b. Girdle covered with small, overlapping and narrowly oval scales bearing fine transverse ridges; shell valves gently arched, with a conspicuous sculpture of reticulated threads (median area) and granular ribs (lateral areas); insertion plates generally with 2 slits on each side of intermediate valves and with 14 to 18 slits on head valve . . . . . ***Ischnochiton textilis***

**List of species of interest to fisheries occurring in the area**

The symbol ● is given when species accounts are included.

● *Chaetopleura papilio* (Spengler, 1797).

● *Ischnochiton textilis* (Gray, 1828).

**References**

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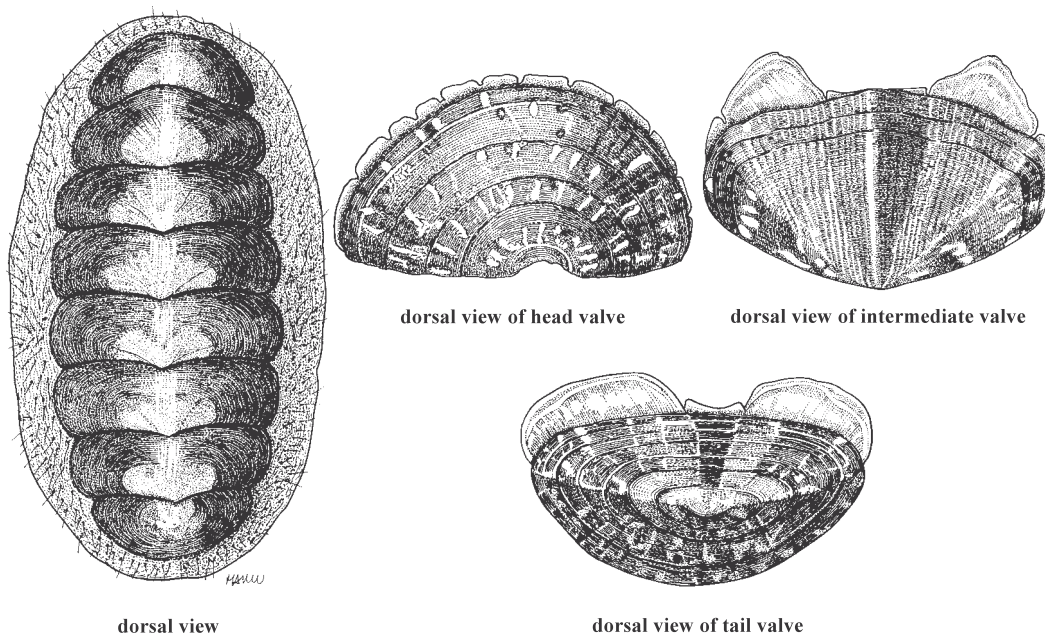
**Kilburn, R.N. & Rippey, E.** 1982. *Sea Shells of Southern Africa*. Johannesburg, Macmillan, 249 pp.



***Chaetopleura papilio* (Spengler, 1797)**

**Frequent synonyms / misidentifications:** ? *Chiton fuscus* Gmelin, 1791; *C. papilio* Spengler, 1797; *C. watsoni* Sowerby, 1840 / *Callochiton castaneus* (Wood, 1815).

**FAO names:** En – Butterfly chiton; Fr – Chiton papillon; Sp – Chitón mariposa.



**Diagnostic characters:** Whole animal rather large-sized (up to 7 cm long), elongate oval in outline, width slightly larger than half of the length. **Girdle** thick and **leathery**, with scattered **stiff**, straight or curled **bristles**. **Shell valves usually steeply arched**, with a slight median ridge, a **polished surface and faint sculpture**. Tegmentum with **feeble radial threads** and more or less distinct **tiny sparse granules** on end valves and **on lateral areas** of intermediate valves; very **fine** and closely set longitudinal **grooves** present **on median area** of intermediate valves. **Insertion plates** narrow, with **1 slit on each side of intermediate valves, 9 to 11 slits on head and tail valves**.

Sutural plates large, produced forward, connected across the jugal sinus by a narrow, concave plate which is deeply notched at the sides. **Colour:** outside of **shell deep mahogany brown**, usually with **paler**, irregularly flecked area in **central part of the valves**, and with or without small bluish white spots on end valves and lateral areas of intermediate valves. **Girdle dark brown**, with blackish bristles. Interior of shell white, becoming pinkish brown in the centre of all valves.

**Size:** Maximum shell length 7 cm, commonly to 5 cm.

**Habitat, biology, and fisheries:** Common under rocks, in low tide pools, but also occurring deeper in sublittoral zone and continental shelf, to a maximum depth of 290 m. Often used as bait by anglers in South Africa.

**Distribution:** Southeastern Atlantic, from Namibia to False Bay (South Africa).

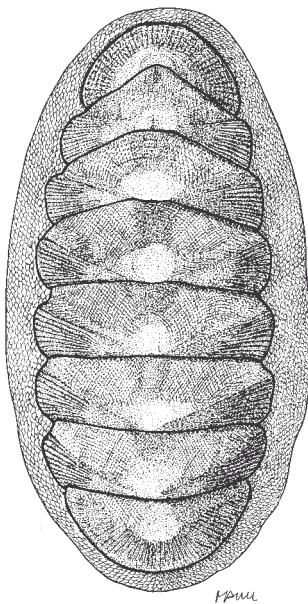


***Ischnochiton textilis* (Gray, 1828)**

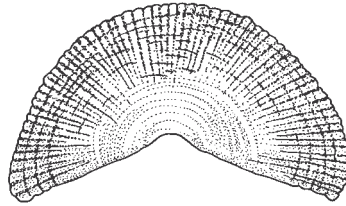
**Frequent synonyms / misidentifications:** *Chiton textilis* Gray, 1828; *Ischnochiton tigrinus* (Krauss, 1848) / *Ischnochiton textilis* Pilsbry, 1892 (not of Gray, 1828) = *Ischnochiton bergoti* (Vélain, 1877).

**En** – Textile chiton; **Fr** – Chiton textile; **Sp** – Chitón textil.

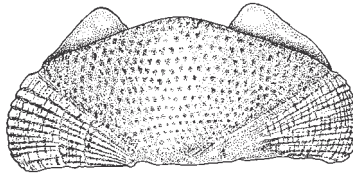
Maximum shell length 5 cm, commonly to 4 cm. Commonly found on underside of rocks, in intertidal pools. Often used as bait by anglers in South Africa. Southern Africa, from Namibia to South Natal (South Africa).



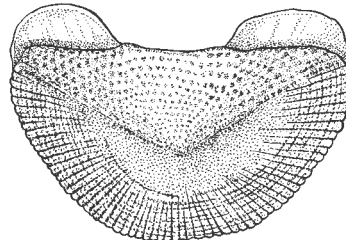
dorsal view



dorsal view of head valve



dorsal view of intermediate valve



dorsal view of tail valve



# CEPHALOPODS

by A. Guerra<sup>1</sup>, A.F. Gonzalez<sup>1</sup>, M. Roeleveld (†), and P. Jereb<sup>2</sup>

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## GENERAL REMARKS

Cephalopoda first appeared about 500 million years ago in the Upper Cambrian and form 1 of the 3 largest classes of the phylum Mollusca. They have bilateral symmetry with a well developed head that contains a circumoral crown of mobile arms, surrounding the mouth, that bear suckers and/or hooks. The mouth has chitinous beak-like jaws and a chitinous tongue-like radula (band of teeth). They share with other molluscs the ability to secrete a shell, which is reduced, modified, or absent and is enclosed by the mantle. However, an external shell occurs in the primitive form *Nautilus*. Cephalopods are soft-bodied animals with their primary skeletal features, a cranium and, in most forms, a mantle support (cuttlebone or gladius), or an internal shell where fins attach, which has an unusual consistency (i.e. cartilage-like structure) and an unusual shape (i.e. a U, V or saddle-shape). One pair of gills is present, although *Nautilus* has 2 pairs. Cephalopods nervous system is highly developed, and has a central brain far larger than other molluscs. The sense organs, especially the well-organized eyes, are elaborate and complex. A funnel expels water from the mantle cavity providing propulsion and expelling waste products. Coloration is variable depending on group and habitat; most forms are provided with numerous chromatophores (pigment sacs) and iridocytes (shiny, reflective platelets) in the skin, so rapid changes in colour and colour patterns are an integral part of their behaviour (Hanlon and Messenger, 1996).

The size of adults' mantle length (ML) ranges from about 8 mm in the family Idiosepididae to over 2.5 m in the giant squid *Architeuthis*. Cephalopods are the most active among molluscs and some squids rival fishes in their swimming speed. Locomotion is achieved by drawing water into the mantle cavity followed by its jet-like expulsion through the funnel and also by crawling along the bottom on the arms (mostly sepioids and octopods). Fins on the mantle provide balance, steering and minor locomotion. Many species of deep water squids adopt a passive life-style using accumulate ammonium salts and reduced musculature to achieve neutral buoyancy.

Two groups of cephalopods exist today: the Nautiloidea, which includes a few species of pearly nautilus restricted to the Indo-Pacific, and the Coleoidea, which includes all other living cephalopods (cuttlefishes, squids, octopods and vampires). No general consensus exists at present on the higher classification of Recent Cephalopods, which is generally accepted and recognized as unstable (see Boletzky, 1999; Young *et al.*, 2010 *ToL*). Various honorable and respected authors have suggested varying arrangements (see Jereb and Roper, 2005); however, it looks like there is a questionable phylogenetic basis for accepting any of these or other schemes (Young *et al.*, 2010). Consequently, rather than accept and promote any particular scheme of classification before consensus and stability are achieved, we will use an operational breakdown that is entirely satisfactory for the objectives of this Guide. For practical purposes we separate the cephalopods into the following groups: Nautiluses, Cuttlefishes, Bobtail squids, Bottletail squids, Pygmy squids, Ram's Horn squid, Myopsid squids, Oegopsid squids, Vampires, Cirrate octopods, and Incirrate octopods. However, research has increased significantly in the past decades and detailed studies on taxonomy are undergoing, currently; genetic analysis and molecular studies also are undergoing. Therefore, a better understanding of the systematic of the group should be achieved in the next future. Cephalopods are exclusively marine animals. Although cephalopods are generally stenohaline, the cuttlefish, *Sepia officinalis* and the squid, *Lolliguncula brevis* are two of the few species known that tolerate low seawater salinity (<16). Over 700 species of living cephalopods are known; about 150 species in 35 families occur in the eastern central Atlantic. Cephalopods occur in all marine habitats: benthic on coral reefs, grass flats, sand, mud and rocks; pelagic and epipelagic in bays, seas and the open ocean. The range of depths extends from 0 to over 5 000 m. Some species, like the vent octopus, *Vulcanoctopus hydrothermalis* are adapted to inhabit areas close to deep hydrothermal vents. Abundance of cephalopods varies (depending on group, habitat and season) from isolated territorial individuals through small schools with a few dozen individuals to huge schools of oceanic species with millions of specimens.

Cuttlefishes and bobtail squids are characteristic of littoral waters. Instead of hiding among stones and rocks, sepioids and sepiolids are able to bury themselves partially or completely to conceal themselves and avoid predation or maximize their efficiency to capture prey. In order to bury themselves, the sediment is blown up using the funnel jet to excavate a depression and using the lateral fins to flick sand over their dorsal surface. They are active, bottom-dwelling predators. The best known genus is *Sepia*, some species of which support important commercial fisheries all over the world, except in the Americas where they are not present. In many members of this genus, the internal chambered shell functions as a buoyancy device.

True squids (Myopsid and Oegopsid squids) consist of a very large and diverse assemblage of families which differ widely in habitat and distribution and include species of great importance to commercial fisheries. Myopsid squids, whose eyes are covered by a translucent membrane and generally have long fins, are typified by squids of the genus *Loligo*. They are coastal animals, sometimes of great seasonal abundance.

They attach spawned egg masses to various substrates on the sea bottom and complete their life cycle in coastal waters. Oegopsid squids, or "opened eyes" squids, include a great number of families, ranging from obscure deep-water species to the short-fin ommastrephid squids of the genera *Illex*, *Todarodes* and *Ommastrephes*, which comprise some of the most important commercial fisheries in the world. Their life-cycle is related to the main oceanic currents systems and areas of nutrient-rich upwellings over the continental shelves. Many ommastrephid squids migrate over large distances, and are able to swim at high velocity. They apparently release large, neutrally buoyant egg masses, and complete their entire life cycle in open waters.

Octopods comprise 2 different forms: the cirrate or finned octopods and the incirrate octopods. The main characteristics of the first group, mainly deep-sea species, are the presence of fins attached to the end of the body and supported by an internal shell, and the presence of cirri alternating with suckers along the arms. Incirrates are about 85% of all octopod species. The Octopodidae, the family with the highest number of species, are benthic and include those species used for most studies in captivity, as well as the most important species from a commercial point of view. The other incirrate families comprise pelagic species. Benthic incirrate octopods live from the intertidal zone to at least 4 000 m depth. Coastal octopuses are widely distributed and epibenthic, living on or close to the bottom. Normally, they are associated with stony or rocky habitats where they can both shelter and find a wide range of invertebrate preys. The octopodids exhibit sophisticated behaviour; the brain of benthic octopuses, with particular reference to the common octopus, *Octopus vulgaris*, has become a model for relating brain structure to function (Nixon and Young, 2003).

The vampire squid is a rather small-sized species, reaching a maximum of 130 mm mantle length, with a very gelatinous body; its consistency is that of a jellyfish. It occupies meso- to bathypelagic depths throughout the tropical and temperate regions of the world's oceans. The second pair of arms is modified into retractile filaments that can extend to lengths well in excess of the total length of the animal and can be retracted into pockets within the web. These filaments, presumably, have a sensory function.

All cephalopods have separate sexes and many, though not all, exhibit external sexual dimorphism, differing either morphologically or in size. Females are generally larger than males (Mangold, 1989). Males of many forms possess 1 or 2 modified arms (hectocotyls) for mating. The hectocotylus may consist of modified suckers, papillae, membranes, ridges and grooves, flaps, etc., but in any case it functions to transfer the sperm packets, or spermatophores, from the male's mantle cavity to a site of implantation on the female; this may be located inside the mantle cavity, around the mantle opening on the neck, in a pocket under the eye, around the mouth, etc. Fertilization takes place not always "in" (i.e. "inside") the female as the eggs are laid. Cuttlefishes lay relatively few, large grape-like eggs that are attached to hard substances and are often coloured in black by a covering of ink deposited by the female at egg-laying. Eggs of squids are generally encased in a gelatinous matrix secreted by the nidamental glands and are deposited as multiple finger-like capsules attached to rocks, shells or other hard substrate on the bottom, in shallow waters, or are extruded as large, singular, sausage-shaped masses that drift in the open sea. These capsules may contain a few to several hundred eggs each, while the sausage-shaped masses contain tens or even hundreds or thousands of eggs. The mode of reproduction and egg-laying is unknown for many cephalopod forms, especially oceanic and deep-sea species. Benthic octopuses lay their eggs in grape-like clusters and strands in lairs, under rocks and in abandoned mollusc shells, where they brood them until they hatch. The eggs are attached to each other but they are not encased in a gelatinous matrix. Females of the pelagic octopod *Argonauta* constructs a thin, shell-like egg case in which they reside and lay festoons of eggs; fertilization occurs from sperm contained in the highly modified hectocotylus that is autotomized by males and deposited in the egg case. Reproductive strategies of cephalopods are very complex (Rocha *et al.*, 2001). Accordingly, depending on the type of ovulation, spawning pattern and growth between egg batches or spawning periods, the following classification is proposed: (a) spawning once (semelparity), consisting of simultaneous terminal spawning, with synchronous ovulation, monocyclic spawning and absence of growth between egg batches, as in *Loligo opalescens*, for example; (b) spawning more than once (iteroparity), including: (i) polycyclic spawning, in which egg-laying occurs in separate batches during the spawning season and growth occurs between production of egg batches and spawning seasons, as in *Nautilus* spp.; (ii) multiple spawning, in which group-synchronous ovulation, monocyclic spawning and growth between egg batches occurs as in *Ommastrephes bartramii*, for example; (iii) intermittent terminal spawning, in which group synchronous ovulation, monocyclic spawning and no growth between egg batches occur, e.g. as in *Sepia officinalis*; (iv) continuous spawning, in which asynchronous ovulation, monocyclic spawning and growth between egg batches occurs, as in many species of the genera *Opisthoteuthis*, *Cirroteuthis* and *Argonauta*. Sexual maturation is under the control of hormones released from small bodies called optic glands, located in the optic tracts (the structures connecting optic lobes to the brain). The onset of sexual maturity is related to environmental factors, mainly to photoperiod and light intensity. In most of the coastal and epipelagic cephalopods, reproduction is seasonal and both males and females die afterwards. Variation of this

monocyclic reproduction and short life span are found or suspected in deep-water benthic octopuses and a range of other species.

Cephalopods have fast growth rates, between 3 and 15% body weight per day. Since protein is used mainly to produce energy, protein assimilation efficiency is high, with protein digestibility apparently greater than 85 to 90%. The life expectancy is about 1 to 2 years in most forms, but larger species of squids and octopuses, for example, the giant squid (*Architeuthis*) and the giant octopus (*Enteroctopus dofleini*), may live for several years. Ageing of cephalopods can be achieved by using different techniques (see Jereb et al., 1991; Loporati et al., 2008; Perales-Raya et al., 2010), but the use of growth increments deposited in statoliths is one of the most suitable. Statoliths are calcareous structures located within the statocysts and are highly evolved structures, responsible for much of the information necessary to monitor and control balance and orientation in a three-dimensional space.

Cephalopod eggs are very yolky, thus cleavage is incomplete and the typical molluscan spiral cleavage is absent. Development is direct and hatchlings are often miniatures of the adult. Thus, no discrete larval stages or metamorphoses occur. Cephalopod mature eggs may vary in size from 0.8 mm in *Argonauta* to about 29 mm long in some *Sepia* species. Time of embryonic development also varies widely, from a few weeks to several months, depending on the species and temperature conditions. Hatching may occur rapidly from a single clutch or be extended over 60% of the life span in continuous spawning species. At hatching, young animals often inhabit different habitats than the adults. For example, the young of many species of benthic octopuses spend periods of time as planktonic organisms before settling to their bottom habitat; these pelagic forms of the first post hatching growth stage, that have a distinctively different mode of life from that of older conspecific individuals, are named "paralarvae". Paralarvae of many species inhabit the upper 100 m of the open ocean, then exhibit an ontogenetic descent, gradually moving to deeper depths with increasing size.

Cephalopods prey actively mainly upon shrimps, crabs, fishes, other cephalopods and polychaetes and, in the case of octopuses, on bivalve molluscs. In turn, cephalopods are major food items in the diets of many large marine predators: toothed whales, dolphins, seals, pelagic birds (penguins, petrels, albatrosses, etc.) and both benthic and pelagic fishes (e.g. sharks, sea basses, lancetfishes, tunas and swordfishes).

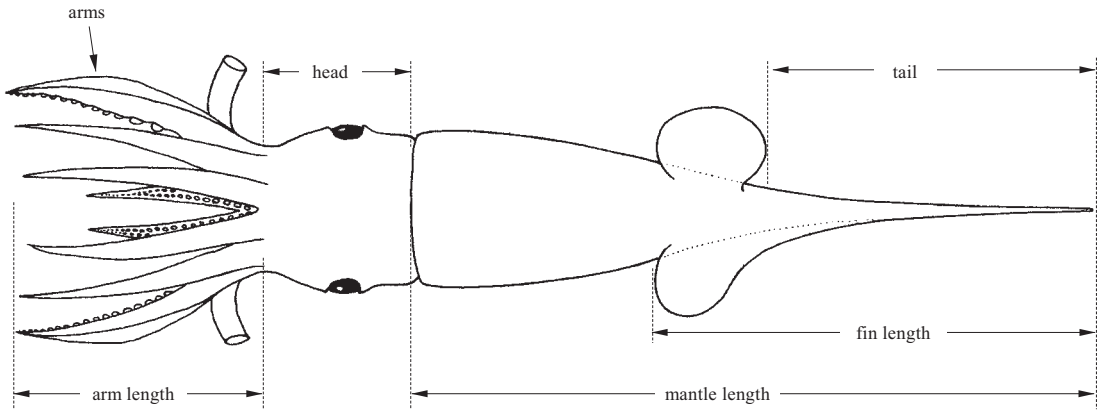
Many species of oceanic cephalopods undergo diel vertical migrations, wherein they occur at depths of about 400 to 800 m during the day, then ascend into the uppermost 200 m or so during the night. While shallow-living cephalopods are able to conceal themselves by chromatophore-produced colour patterns and chameleon-like colour changes, many deep-sea forms camouflage themselves by producing bioluminescent light from light organs (photophores), which conceals their silhouettes against the downwelling light in the dimly-lit mid-depths. Coleoids have an ink sac, which is absent in the majority of deep-sea species. Discharge of ink (almost pure melanine) typically occurs when the animal is startled into an escape reaction or during active pursuit by a predator.

Cephalopods are extremely important as food for human consumption, and well over 3.2 million metric tonnes are caught each year. The fisheries are especially intense in the western Pacific, southwestern Atlantic and in the Mediterranean Sea, to the eastern Atlantic waters. Cephalopods are also important experimental animals in biomedical research with direct application to human. Due to their highly developed brain and sensory organs, cephalopods have a great capacity to learn and remember, which makes them valuable in behavioural and comparative neuroanatomical studies. In addition, cephalopods possess the largest single nerve axons in the animal kingdom; these axons extend to the mantle, and are used extensively in many branches/subjects of neurophysiological research.

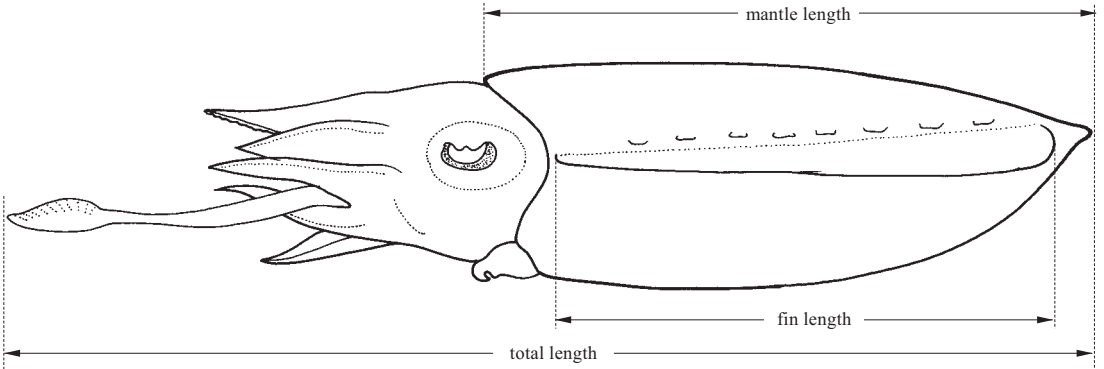
Fishing techniques include small traps, pots, wiers, lures, spears and jigs, gill and seine or lampara nets and midwater and otter trawls. Several species of squids are attracted to light, then jigged or seined. Occasionally, cuttlefishes and octopods are caught in hand-nets or are speared, but it is nearly impossible to capture free-swimming squid in this manner. The bites of some cephalopods, especially octopuses, can be painful at the least and become secondarily infected, but may also be poisonous or, occasionally, lethal (several human deaths have been recorded in Australia due to blue-ringed octopus, *Hapalochlaena*). The poison is secreted by the paired posterior salivary glands, which are a cocktail of enzymes and other secretions injected into the prey via the salivary papilla. Therefore, cephalopods must be handled carefully.

The total commercial catch of cephalopods in the eastern central Atlantic is estimated at around 200 000 tonnes, but the potential for major fisheries for several species is high. Therefore, it is likely that an increasing fishing effort will be focused toward the exploitation of cephalopod resources in this area (e.g. Boyle and Rodhouse, 2005). This, in turn, supports the need to increase our efforts to monitor cephalopod catches and to improve our scientific knowledge on this group. Present understanding of the marine system indicates that removal of cephalopods through fisheries would have a dramatic impact on the environment.

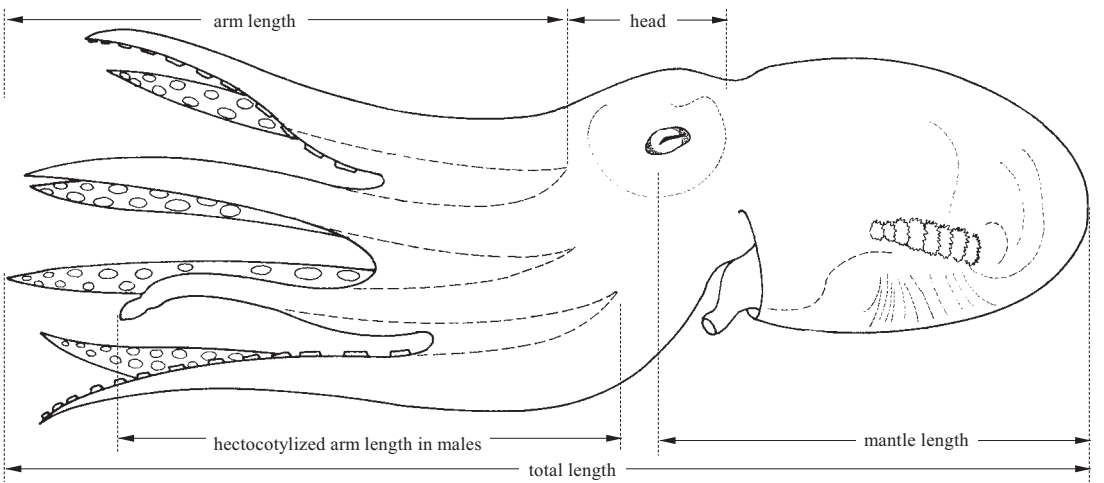
### TECHNICAL TERMS AND MEASUREMENTS



a) schematic illustration of a squid



b) schematic illustration of a cuttlefish



c) schematic illustration of an octopus

Fig. 1

**ILLUSTRATED GLOSSARY OF TECHNICAL TERMS<sup>1/</sup>**

**Abdominal septum** – Median septum traversing the posterior mantle cavity parallel to the body axis. It extends from the posterior visceral mass to the ventral mantle wall. The ventral mantle artery runs along the dorsal edge of this septum.

**Aboral** – Away from or opposite to the mouth.

**Abysal** – The greatest depths of the ocean: from 2 000 to 6 000 m.

**Accessory nidamental glands** – Glands consisting of tubules containing symbiotic bacteria. Found in sepioids and loliginid squids (Fig. 25).

**Afferent blood vessel** – Artery vessel carrying blood toward an organ.

**Anal flaps** – A pair of fleshy papillae on the lateral sides of the anus involved in directing releases of ink (Fig. 2).

**Anal pads** – Ovoid pads of unknown function, apparently glandular, located on both sides of the anus in some bobtail squids (sepioids).

**Anterior** – Toward the head-end or the arm tips.

**Antitragus** – Knob that projects inward from the posterior surface of the central depression in the funnel locking cartilage of some squids (Fig. 3).

**Arm** – One of the circumoral appendages of cephalopods. In Decapodiformes (10 circumoral appendages) each member of the fourth pair of arms is modified to form a tentacle. Arms are designated by the numbers I to IV, starting with I as the dorsal (or upper) pair.

**Armature** – The grappling structures of the arms and tentacles, including both suckers and/or hooks.

**Bathypelagic** – The deep midwater region of the ocean.

**Beak** – One of the 2 chitinous jaws of cephalopods. The dorsal beak is the "upper" beak and inserts within the ventral "lower" beak to tear tissue with a scissors-like cutting action.

**Benthopelagic** – A free-swimming animal that lives just above the ocean floor but rarely rests on the ocean floor.

**Brachial** – Pertaining to the arms.

**Brachial crown** – The combination of arms and tentacles that surround the mouth.

**Brain** – Medial portion of the central nervous system. It includes the subesophageal and supraesophageal masses but generally does not include the large optic lobes.

**Branchial** – Pertaining to the gills.

**Brooding** – Incubation of eggs by the parent. A characteristic feature of incirrate octopods but also found in some squid (e.g. **Gonatidae**).

**Buccal** – Pertaining to the mouth.

**Buccal connective** – Thin muscular membrane that runs from the buccal support to the base of the adjacent arm (Fig. 4). The position of the attachment of the connective on the fourth (IV) arms is an important character in interpreting phylogenetic relationships among decapodiforms.

**Buccal crown** – Umbrella-like structure that surrounds the mouth and in turn is enveloped by the brachial crown. It consists of buccal supports and the buccal membrane. The buccal crown is present in most decapodiforms but it is missing in all octopodiforms.

**Buccal lappet** – see **Buccal support**.

<sup>1/</sup> According to cephalopod scientific terminology standards (see Roper and Voss; Norman and Hochberg, 2005; Vecchione *et al.* Tol, in progress).



**Buccal mass** – Muscular bulb at the beginning of the digestive system that contains the mouth, beaks, radula, muscles and pair of salivary glands.

**Buccal membrane** – The muscular membrane that encircles the mouth like an umbrella. It connects the buccal supports and together with the supports, forms the buccal crown. The pigmentation of the buccal membrane often differs from that of the adjacent oral surfaces of the arms (Fig. 4).

**Buccal suckers** – Small but normal suckers on the oral surface of the buccal supports in some decapodiforms (Fig. 4).

**Buccal support (= Buccal lappet)** – One of 6 to 8, large muscular flaps on the buccal crown that surround the mouth. The supports are connected by the buccal membrane. The buccal supports are thought to be homologous with the inner ring of tentacles that surround the mouth of *Nautilus*. May bear suckers (Fig. 4).

**Bursa copulatrix** – The wrinkled area present in some sepiolids near the female genital opening, for the attachment of the spermatophores; it is more differentiated in members of the subfamily Sepiolinae where it forms a characteristic structure called 'bursa' (Fig. 5).

**Caecum** – Region of the digestive tract of all cephalopods between the stomach and intestine. It is the primary site of food absorption.

**Calcareous (= Calcified)** – Composed of calcium carbonate ( $\text{CaCO}_3$ ).

**Calamus** – The conical papilla at the base of the ligula in the hectocotylus in many incirrate octopods. It is located at the distal termination of the sperm groove and usually lies adjacent to the last arm sucker (Fig. 6).

**Carpal-fixing apparatus** – see **Carpal-locking apparatus**.

**Carpal knobs** – Small, rounded, hemispherical, muscular protuberances on the carpus to which carpal suckers from the opposite club adhere during the locking of the clubs (Fig. 7).

**Carpal-locking apparatus (= Carpal-fixing apparatus)** – Arrangement of suckers and matching knobs on the carpal region of the tentacle club that permits the 2 clubs to be locked together (Fig. 7).

**Carpal suckers** – Small suckers on the carpus of the club that adhere to the carpal knobs on the opposite carpus during the locking of the clubs (Fig. 7).

**Carpus** – The "wrist" of the club. Area at the base of tentacular club in some families where small suckers and knobs are located (Fig. 7).

**Cartilaginous scales** – See **Cartilaginous structures**.

**Cartilaginous structures (= Cartilaginous scales and/or Cartilaginous tubercles)** – Rigid cartilage-like structures with 1 to several cusps, in the skin of certain oegopsid squids and a few octopods (Fig. 8). They may be overlapping and scale-like, or multifaceted platelets, knobs or papillae in certain oegopsid squid families.

**Cartilaginous tubercles** – See **Cartilaginous structures**.

**Cement body** – Structure within spermatophores that draws the sperm cord into a bulb during spermatophore eversion (Fig. 16). Ultimately, it allows adhesion of the discharged spermatophore to a female.

**Cephalic cartilage** – Cartilage-like tissue that envelop the posterior part of the brain of cephalopods and encompasses the statocysts.

**Chitin** – A horny polysaccharide substance (fingernail-like) that forms the sucker rings, hooks and beaks of cephalopods.

**Chorion** – A tough secreted membrane that surrounds the egg.

**Chromatophore** – A pigment cell. In cephalopods each chromatophore comprises an elastic sac containing pigment granules that is surrounded by many radial muscles. Under nervous control, the muscles rapidly expand and flatten the pigment sac which spreads the pigment over a relatively broad area.

**Cirri** – Elongate, fleshy, finger-like papillae occurring along the lateral edges of the sucker row in cirrate octopods and vampires (Fig. 9). Terms formerly used with reference to erected papillae on the skin of incirrate octopods, usually over the eyes (Fig. 10).

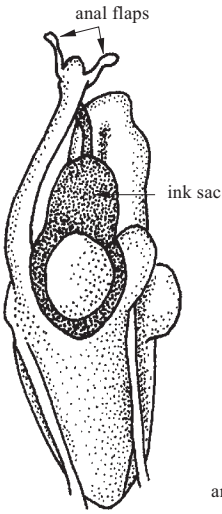


Fig. 2 terminal portion of digestive tract

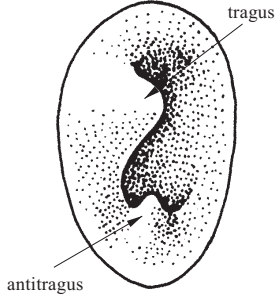


Fig. 3 funnel locking cartilage

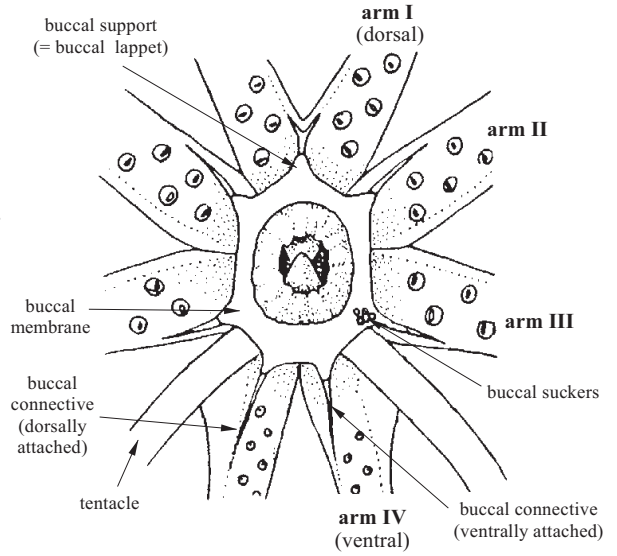


Fig. 4 buccal anatomy of decapods

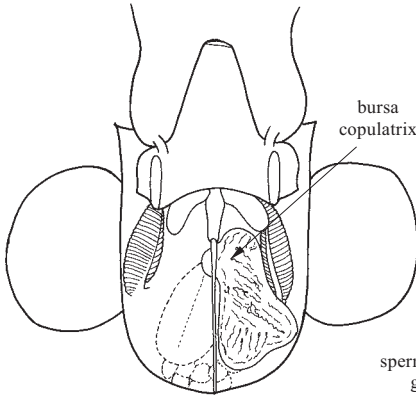


Fig. 5 mantle cavity of female *Sepiola rondeletii* showing the bursa copulatrix

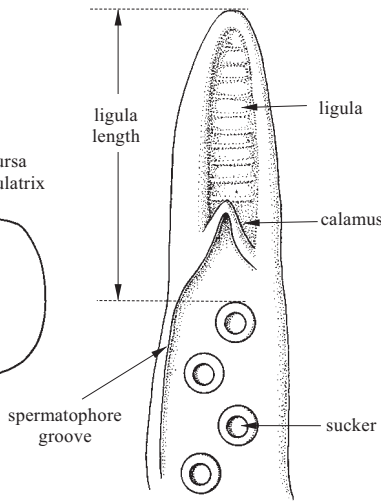


Fig. 6 distal tip of hectocotylus of cirrate and incirrate octopods

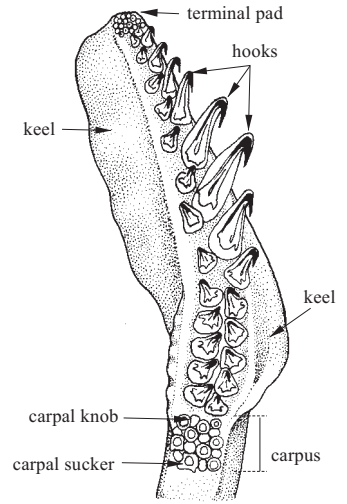


Fig. 7 tentacular club of squid

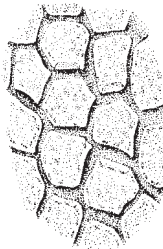
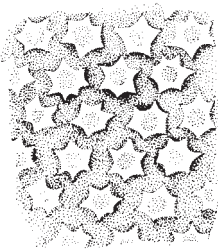


Fig. 8 two types of cartilaginous structures or 'scales'

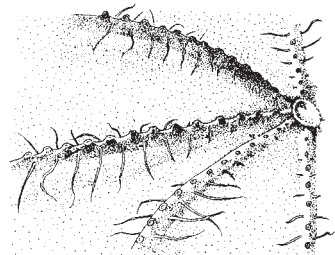


Fig. 9 cirri on arms of cirrate octopods

**Coelom** – An internal body cavity of mesodermal origin that is lined by an epithelium. Cephalopods have 2 coeloms, the visceropericardial coelom and the nephridial coelom.

**Collar** – Muscular structure extending from the nuchal cartilage to the funnel that forms a one-way valve that lets water enter the mantle cavity but closes as the mantle contracts thereby forcing exhalent water out through the funnel.

**Cone** – Term used to refer to the hollow end of the inner structures in cuttlebones and gladius or pen (Fig. 11).

**Conus** (= primary conus) - The cup or cone-shaped posterior end of the gladius of some cephalopods. It is not formed by the infolding of the vanes.

**Conus field** – The sides of the conus that continue along the vanes of the gladius.

**Cornea** – Smooth, thin, turgid, transparent skin without muscles that covers the eyes to protect the eye lenses of incirrate octopods and some decapodiforms (sepioids and myosid squids) (Fig. 12).

**Counterillumination** – The production of bioluminescent light by an animal to conceal its silhouette against the downwelling light.

**Crop** – Expansion (i.e. a broadening or a side pocket) of the oesophagus for storing food. Present in *Nautilus* and most octopodiforms (Fig. 14).

**Cuttlebone** (= **Sepion**). The calcareous (chalky) oblong supporting protective and buoyancy shield in the dorsal part of the mantle of cuttlefishes (Fig. 13).

**Dactylus** – The distal section of the tentacular club of most decapodiforms, often characterized by suckers of reduced size (Fig. 12).

**Decapodiformes** (= **Decabrachia** = **Decapods**) – Higher-level taxon (superorder) including ram's horn squid, cuttlefish, bobtail squid, myopsid and oegopsid squids. Even though the term 'decapods' was preoccupied by crabs (crustaceans), there is a long tradition of referring to these cephalopods by the common name 'decapods'; therefore this is maintained as a common name for **Decapodiformes**.

**Demersal** – Organisms that live close to the ocean floor.

**Diel vertical migration** – Vertical migration of animals in response to changes in downwelling light.

**Digestive gland** – Primary organ in cephalopods that secretes digestive enzymes. It is also important in absorption and excretion (Fig. 14).

**Distal** – Situated away from the point of origin or attachment. For example, the arm tip is the distal end of arm.

**Dorsal** – Toward the uppermost surface of a cephalopod, opposite the ventral surface where the funnel is located (Fig. 15).

**Efferent vein** – A vein carrying blood away from an organ.

**Egg mass** – A large number of eggs encapsulated in a gelatinous matrix or a large number of such structures that are attached together. The egg mass of an oceanic squid can be a large, fragile gelatinous ball or tube carrying many thousands of eggs. In contrast, the egg mass of a neritic squid (lolliginid) can be composed of very tough capsules each carrying several hundred eggs with many capsules attached together at their bases and to the substrate to form an egg mass.

**Ejaculatory apparatus** – Portion of the spermatophore involved in the vigorous extrusion of the sperm mass (Fig. 16).

**Epipelagic zone** – The uppermost pelagic zone of the ocean.

**Epithelial pigmentation** – The pigmentation that is contained in epithelial cells which are unable to change their shape. Colour in most cephalopods, however, is due to pigment granules that are contained in specialized organs, the chromatophores, which can change shape rapidly under nervous control. (See **Chromatophore**).

**Eye pore** (= **Orbital pore**) – Minute pore in the anterior edge of the transparent membrane (cornea) that covers the eyes of most myosid squids (Fig. 12). The pore is the remnant of the large eye opening of oegopsids and allows fluid exchange between the lens and the exterior environment.

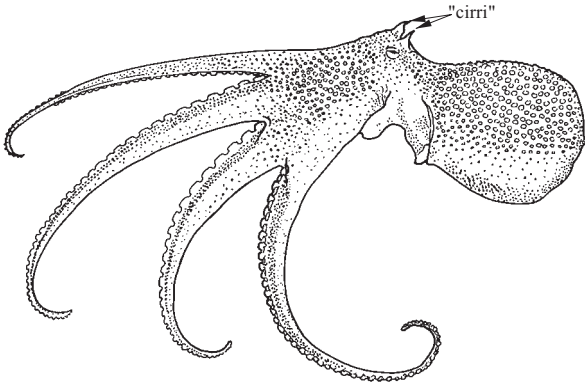


Fig. 10 former use of terms in incirrate octopods

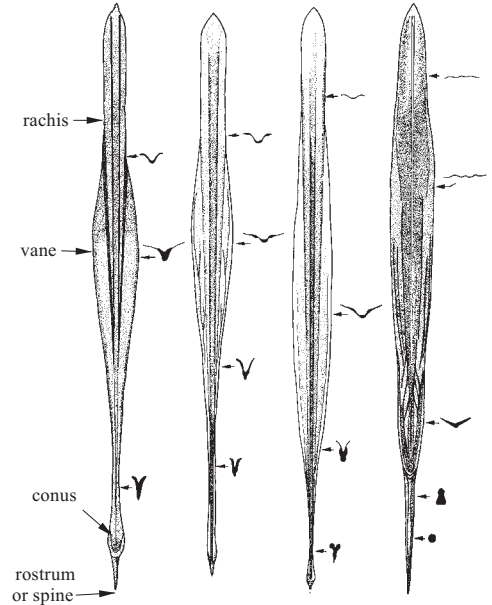
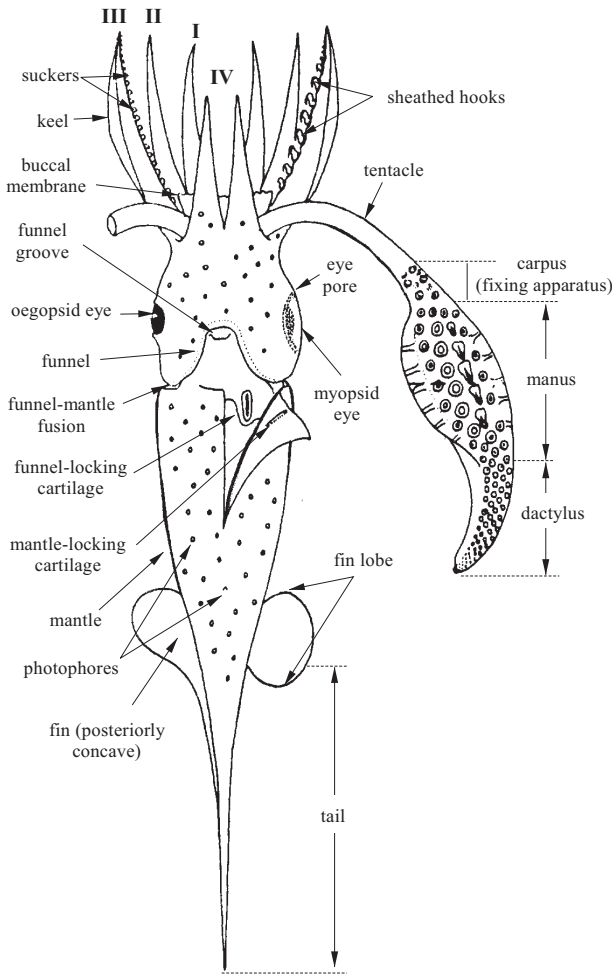
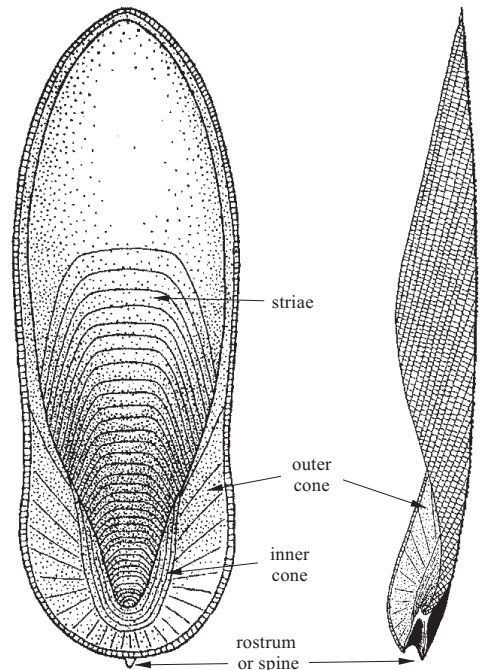


Fig. 11 gladii of some squids



ventral view

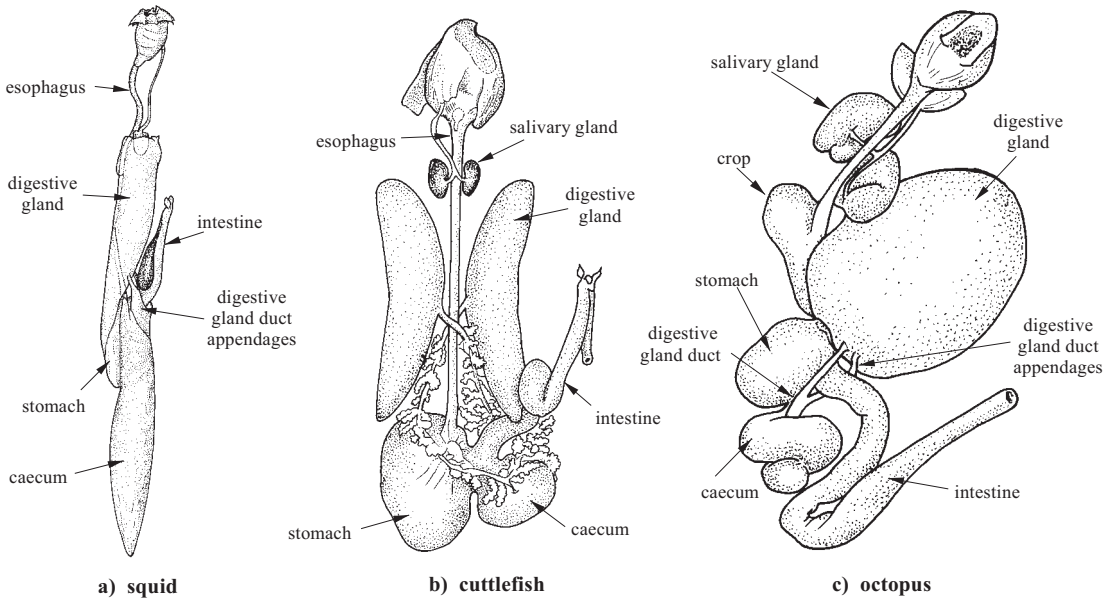
Fig. 12 a composite diagram illustrating basic squid features



ventral view

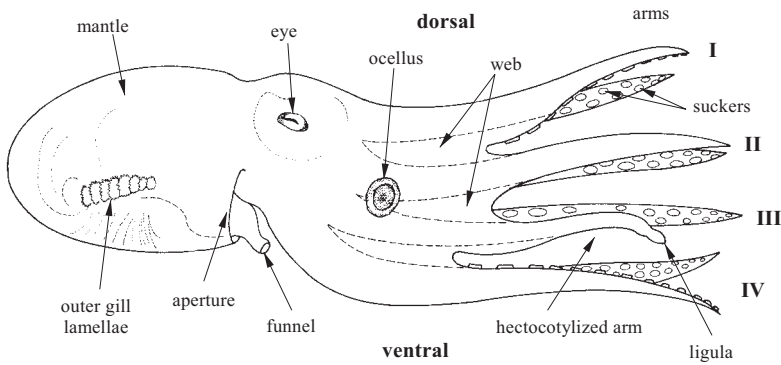
lateral view

Fig. 13 cuttlebone

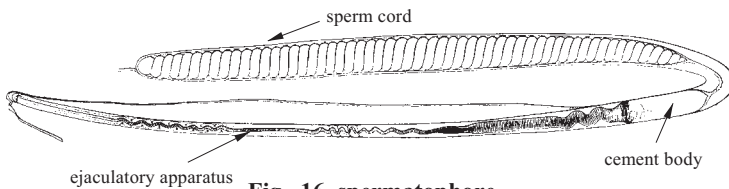


**Fig. 14 digestive system**

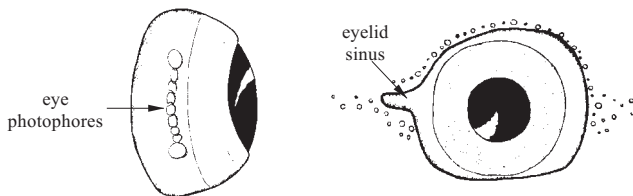
(after Bidder, 1966)



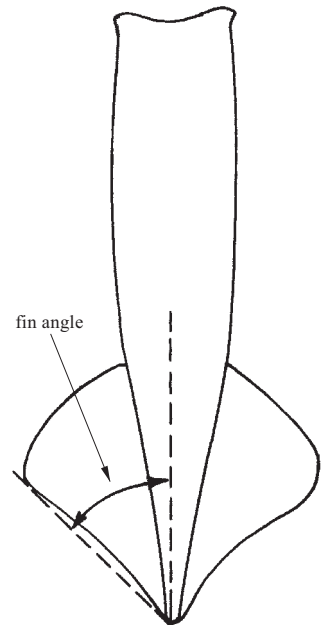
**Fig. 15 schematic lateral view of octopus features**



**Fig. 16 spermiphore**



**Fig. 17 light organs (photophores) on ventral surface of squid eyeball; eyelid or orbital sinus**



**Fig. 18 fin angle on squid**

**Eyelid sinus** (= **Optic sinus** = **Orbital sinus**). Indentation, often complex, of the anterior margin of the eyelid (Fig. 17).

**Filamentous appendages** – A pair of modified arms in pouches between bases of arms I and II in *Vampyroteuthis*.

**Fin(s)** – The pair of muscular flaps located along the dorsolateral surface of the mantle, usually in its posterior half; used for locomotion, steering and stabilization (Fig. 12).

**Fin angle** – The angle between the longitudinal axis of the mantle and the posterior border of the fin (Fig. 18).

**Fin lobe** – The portion of a fin that extends anteriorly from the fin's anterior point of attachment and/or posteriorly from the fin's posterior point of attachment. This is often called the "free" lobe.

**Fin support** – Cartilage associated with the fins of all fin-bearing cephalopods. In *Vampyroteuthis* and Cirroctopoda this cartilage is a conspicuous internal shell that has different forms.

**Foveola** – Transverse membranous fold of skin that forms a pocket in the funnel groove of some oegopsid squids (Fig. 20) (see **Side pockets**).

**Funnel** – The ventral, subconical muscular tube through which water is expelled from the mantle cavity during locomotion and respiration. The reproductive, waste products and the ink also pass through the funnel (Fig. 12). Archaic term: **siphon**.

**Funnel groove** – The depression in the ventral surface of the head into which the funnel fits (Fig. 12).

**Funnel-locking cartilage** – The cartilaginous groove, pit, pocked or depression on each ventrolateral side of the posterior part of the funnel that joins with the mantle component to lock the funnel and mantle together during locomotion and respiration, so that water is expelled only through the funnel and not around the mantle opening (Figs 20 and 21) (see **Mantle-locking cartilage**).

**Funnel-mantle locking apparatus** – The locking mechanism composed by the funnel-locking cartilage and the mantle-locking cartilage.

**Funnel organ** – The glandular structures on the internal dorsal and ventral surfaces of the funnel (Fig. 21).

**Funnel valve** – Semicircular muscular flap in the dorsal inner surface near the distal opening of the funnels in some species (Fig. 21).

**Gill(s)** – Paired organs for the exchange of respiratory gasses with sea water (Fig. 25a, b, c).

**Gill lamella** (= **Primary lamella**) – Gill leaflet that extends perpendicular to the axis of the gill and contains the respiratory epithelium (Fig. 22). The lamella contains further subdivisions, the secondary and tertiary lamellae.

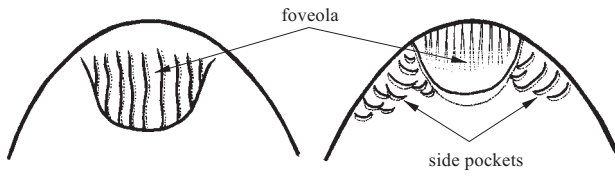
**Gladius** (= **Pen**) – The chitinous remnant of the shell in many decapodiforms and *Vampyroteuthis*. It is generally feather-shaped and lies in the dorsal midline of the body along the full length of the mantle. The gladius lies within the shell sac which secretes it (Fig. 11).

**Gonoduct(s)** – Tubular structure of the reproductive system which serves to transport reproductive products from the gonads to the exterior (see **Oviducts**, **Sperm duct**, **Spermatophoric duct**).

**Hatchling** – Young cephalopod that has just hatched from the egg.

**Hectocotylus** – One or more modified arm in male cephalopods used for transferring spermatophores to the female; modifications may involve suckers, sucker stalks, protective membranes, trabeculae (Figs 6, 15, 23) (see **Calamus**, **Ligula**).

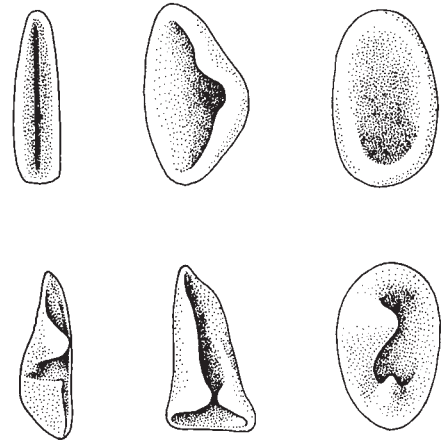
**Hook** – Horny structure that looks like a single claw and is derived from the inner sucker ring in some decapodiforms. Hooks may be found on the arms and/or tentacular clubs of squid (Fig. 7).



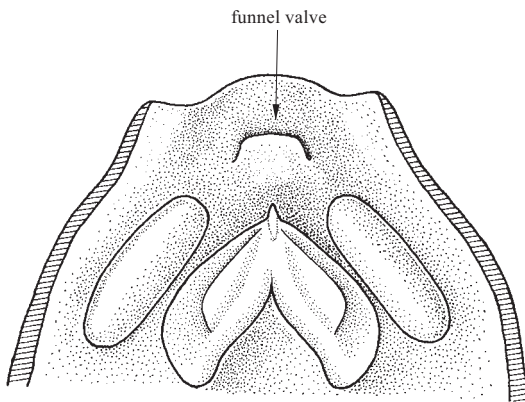
a) *Todarodinae*

b) *Ommastrephinae*

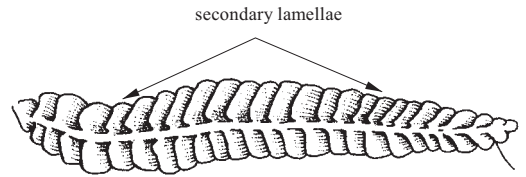
**Fig. 19 funnel groove**



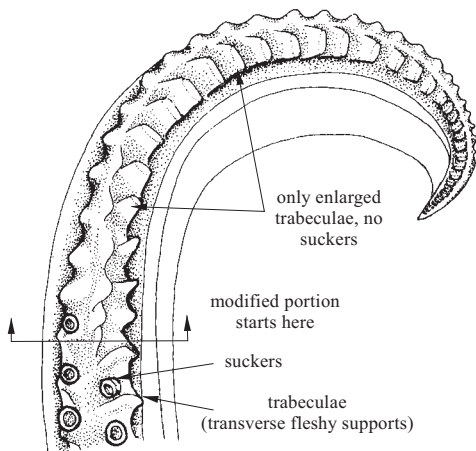
**Fig. 20 funnel locking cartilage**  
(examples of shapes and structures)



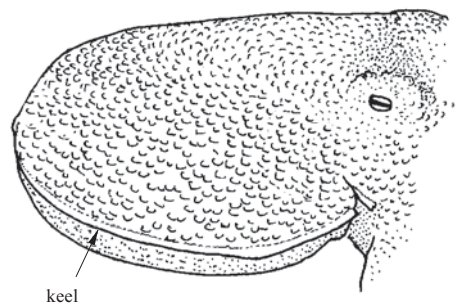
**Fig. 21 funnel organ and funnel valve**  
components on inner surface of funnel of squids



**Fig. 22 gill lamella**  
(primary lamella)



**Fig. 23 hectocotylized arm**  
(*Illex oxygonius*)



**Fig. 24 incirrate octopod**  
(lateral view of the mantle)

**Ink sac** – Organ composed of a gland that secretes ink, a sac that stores ink and a duct that connects it to the intestine (Fig. 25). The ink sac generally appears black from the outside although it may be covered by silvery tissue in some species.

**Juvenile** – Life history stage between the hatchling and the nearly-mature subadult stages.

**Keel** – (1) A flattened, muscular extension along the aboral region of some arms to render them more hydrodynamic (= **swimming membrane**) (Fig. 12); (2) 1 or 2 expanded membranes along the tentacular clubs of some groups (Fig. 7); and (3) lateral ridge of skin around the lateral margin in incirrate octopods (Fig. 4).

**Lateral** – Away from the midline.

**Lateral ridge** – Muscular structure along the lateral region of the mantle of some octopods (see **Keel**).

**Light organ** – See **Photophore** (Fig. 17).

**Ligula** – The spatulate to spoon-shaped, terminal structure of the hectocotylus of many incirrate octopods, that contains the calamus basally (proximally) and usually a series of transverse ridges and grooves of the oral surface (Fig. 6) (see **Calamus**, **Hectocotylus**).

**Mantle** – The fleshy, usually muscular, tube-like or sac-like body wall that covers the visceral region and encloses a space called the mantle cavity.

**Mantle cavity** – Space enclosed by the mantle. In cephalopods the mantle cavity contains the visceral sac, gills, anus, openings of the gonoducts, nephridial pores and various muscles and septa (Fig. 25).

**Mantle length (ML)** – The standard measure of length in coleoid cephalopods. In decapodiforms mantle length is measured along the dorsal midline from the mantle margin to the posterior tip of the body (Fig. 1a, b). In octopods mantle length is measured from a line joining the midpoint of the eyes (rather than the anterior mantle margin since the latter is obscured by the head/mantle fusion) to the posteriormost area of the mantle (Fig. 1c).

**Mantle-locking cartilage** – The cartilaginous ridge, knob or swelling on each side of the ventrolateral, internal surface of mantle that locks into the funnel component of the locking apparatus during locomotion (see **Funnel-locking cartilage**) (Fig. 20).

**Manus** – The central, usually expanded, region of the tentacular club (Fig. 12).

**Mature** – In cephalopods this term refers to sexual maturity which is determined for females by the presence of ova (mature eggs) free in the coelom or oviducts, and for males by the presence of spermatophores in Needham's sac (Fig. 25).

**Medial** – Toward the midline.

**Mesopelagic zone** – The middle-depth zone of the pelagic realm of the ocean.

**Myopsid squids** – Members of the families Australiteuthidae and Loliginidae. This term refers to the character consisting in the presence of a cornea covering the eye lens. Myopsid eyes also are present in cuttlefishes, bobtail squids and relatives.

**Neck** – The region separating the posterior end of the cephalic cartilage and the head musculature (collar). Only those cephalopods with elongate heads (e.g. Chiroteuthidae) have distinct necks.

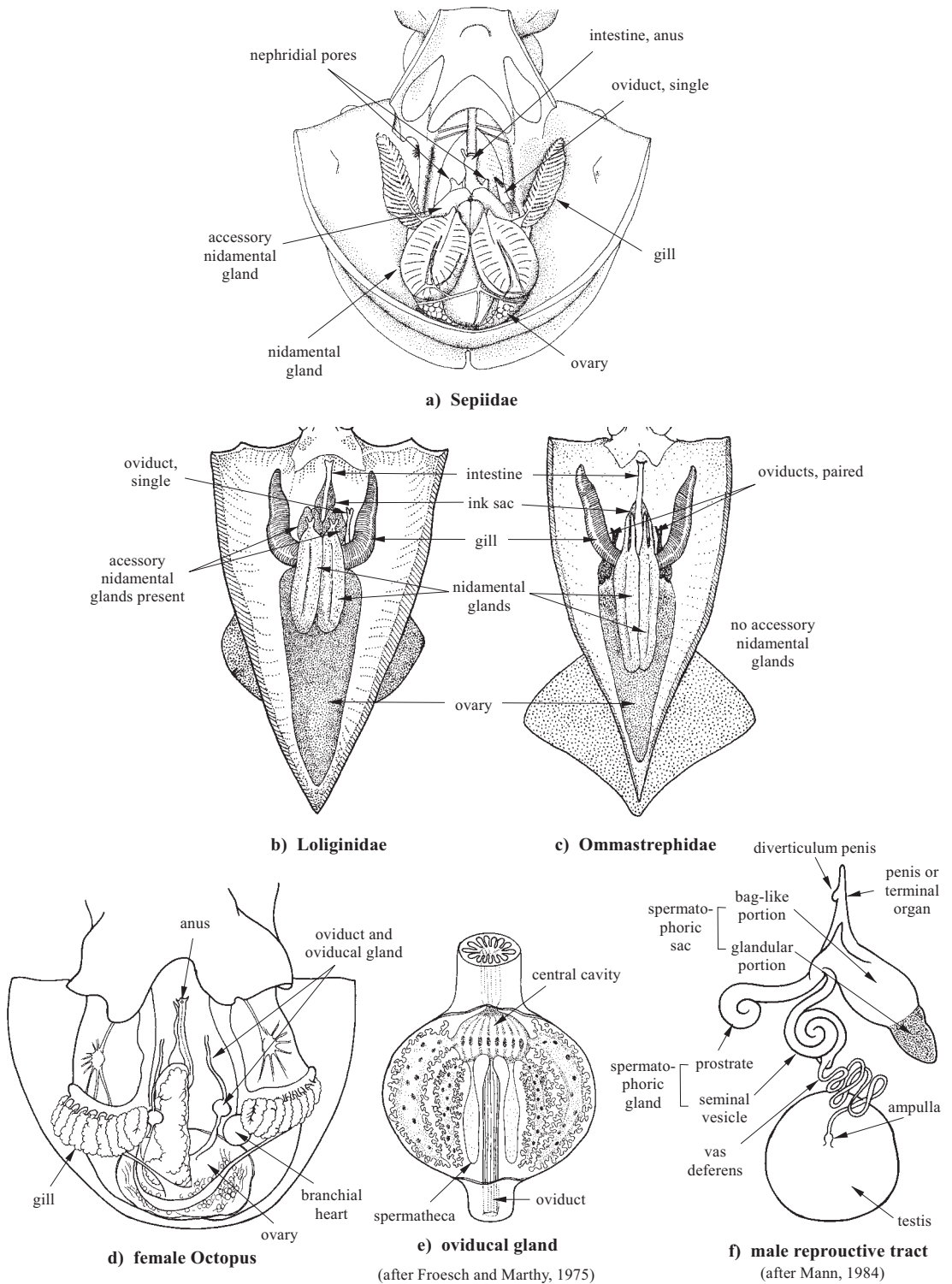
**Needham's sac (= Spermatophoric sac)** – The large storage sac for spermatophores that is an expanded region of the genital duct at the base of the terminal organ or penis in males (Fig. 26).

**Neritic** – The region of the ocean that overlies the continental shelf.

**Nidamental glands** – Large glandular structures found in most female decapodiforms and nautilids that lie in and open directly into the mantle cavity (Fig. 25). The glands are composed of numerous lamellae that are involved in secretion of egg cases or the jelly of egg masses.

**Nominal species** – A species that is based on a morphological type. A properly named species but not necessarily a valid species.





**Fig. 25 internal organs**  
 (a, b and c – Decapodiformes; d, e and f – Octopodiformes)

**Nuchal cartilage** – See **Nuchal-locking apparatus**.

**Nuchal crest** (= **Occipital crest**) – Prominent transverse ridge in most decapodiforms that extends across the dorsal and along the lateral surfaces of the head at its posterior end (Fig. 27).

**Nuchal folds** (= **Occipital folds**) – Fixed folds of the head integument that adjoin the nuchal crest posteriorly and are perpendicular to it (Fig. 27). The function of the folds is uncertain.

**Nuchal-locking apparatus** – A cartilaginous locking structure in decapodiforms located mid-dorsally just posterior to the head. It is composed of the nuchal cartilage, which forms an attachment site for collar and head retractor muscles, and a cartilage on the mantle that underlies the gladius. The apparatus keeps the head and mantle aligned dorsally during mantle contractions (Fig. 27).

**Nuchal membrane** (= **Occipital membrane**). A thin membrane that connects the main nuchal folds at their posterior ends (Fig. 27).

**Ocellus** – A pigmented spot or patch that usually consists of a dark, ovoid locus of concentrate chromatophores but may possess additional outer concentric rings of chromatophores. Ocelli occur on some octopods. May enclose an iridescent ring. Also called '**false eyespot**' (Fig. 15).

**Ocular photophore** – Photophore that lies on the eyeball (Fig. 17).

**Oegopsid squids** – Members of all squid families except Australiteuthidae and Loliginidae. This term refers to the character consisting in absence of a cornea covering the eye lens.

**Oesophagus** – The portion of the digestive tract between the buccal mass and the stomach. In *Nautilus* and most octopodiforms a portion of the oesophagus is expanded to form a crop for food storage (Fig. 14).

**Olfactory papilla** – A pit or bump-like to finger-like organ on the posterolateral surface of each side of the head. It has olfactory function.

**Optic lobe(s) of brain** – Large lobes of the brain associate with the eyes. In octopods and some squids the optic lobes may be separated from the rest of the brain by an optic stalk of varying length. The optic lobes are connected to the brain by the **optic nerves**.

**Optic sinus** – See **Eyelid sinus**.

**Oral** – Toward or on the side of the mouth.

**Orbital pore** – See **Eye pore** (Fig. 12).

**Orbital sinus** – See **Eyelid sinus**.

**Outer cone** – Rim that surrounds the phragmocone in cuttlebones (Fig. 13).

**Oviduct(s)** – Female gonoduct (Fig. 25). The oviduct conducts eggs from the visceropericardial coelom, which holds the ovary, to the exterior and is often used to store eggs. In some argonautoid octopods eggs are fertilized and undergo either partial (*Argonauta*) or complete (*Ocythoe*) embryonic development within the oviduct.

**Oviducal gland** – Gland surrounding the end of the primary oviduct and responsible for secreting some of the external coatings over spawned eggs (Fig. 25d, e).

**Paralarva** – First free-living life history stage for those cephalopods found in the plankton that differ in both morphology and vertical distribution from older juveniles.

**Pedicle** (= **Sucker stalk**) – The structure between the sucker and the arm. In octopods it is a cylindrical structure about the same width as the sucker and in decapodiformes it is constricted into a conical pillar.

**Pelagic** – (1) Free swimming in open ocean; (2) region of the ocean away from the ocean floor.

**Pen** – see **Gladius**.

**Penis** (see also **Terminal organ**) – The long, muscular end of the male gonoduct that assists in transferring spermatophores to the female (Fig. 26). Apparently, in species with a hectocotylus, the penis transfers spermatophores to the hectocotylus which in turn transfers them to the female. In species without a hectocotylus, the penis is often greatly elongate, capable of extending beyond the mantle cavity and can, apparently, transfer spermatophores directly to the female.

**Photophore** (= **Light organ**) – Organ that produces bioluminescence or 'living light'.

**Phragmocone** – Chambered portion of the shell in cephalopods.

**Posterior** – Toward the closed end of the mantle and tail, away from the head and arms.

**Primary conus** – See **Conus**.

**Protective membrane(s)** – Membrane(s), generally supported by trabeculae, which forms lateral borders to the oral surfaces of the arms and tentacular clubs in decapodiforms (Fig. 29) (see **Trabeculae**).

**Proximal** – Situated toward the point of origin or attachment. For example, the proximal end of the arm is the basal end of the arm.

**Pseudomorph** – A mass of ink and mucous that roughly has the dimensions of the cephalopod that secreted it; a false "body" that fixes the attention of a predator while the cephalopod escapes.

**Rachis** – The central axis of the gladius which is usually thickened (Fig. 11).

**Radula** – The chitinous, ribbon-like band in the mouth of cephalopods that contains up to 7 transverse rows of teeth that aid in transport of food into the oesophagus (Fig. 30); it is of a significant higher taxonomic value.

**Rhynchoteuthion** – Paralarval stage of the Ommastrephidae characterized by the fusion of the tentacles into a trunk-like proboscis.

**Rostrum** (= **Spine**) – The spike-like posterior projection of the gladius and cuttlebone (Fig. 11).

**Secondary web** – The narrow membrane that connect each arm to the primary web in some cirrate octopods.

**Sepion** – See **Cuttlebone**.

**Shell sac** – The sac that secretes the shell in the Coleoidea.

**Side pockets** – Pockets formed by small membranous folds of integument lateral to the foveola in the funnel groove (see **Foveola**) (Fig. 19).

**Siphuncle** – The tube-like extension of the body wall, coelom and an external covering tube that penetrates the phragmocone and regulates gas exchange into the phragmocone chambers.

**Sperm duct** (= **Vas deferens**) – Male duct that serves the function to transfer the sperm from the testis to the spermatophoric organ (Figs 25f and 26).

**Spermatophore** – A tubular structure manufactured by male cephalopods for packaging sperm; it is passed to the female during mating. In most coleoids, this structure is very complex and contains a 'rope' of sperm (= sperm mass), an ejaculatory apparatus and a cement body (Fig. 16). Except for the sperm, the entire structure is non-cellular.

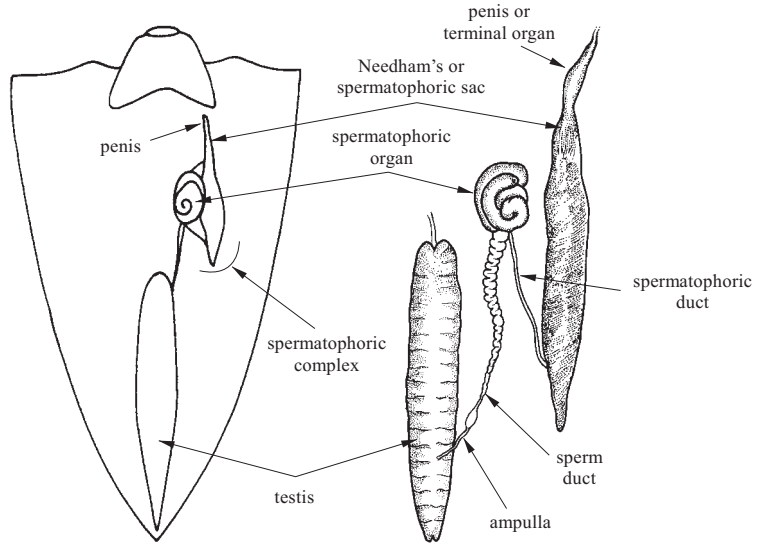
**Spermatophoric complex** – The unit formed by the sperm duct, the spermatophoric organ, the spermatophoric duct, the spermatophoric sac or Needham's sac, and the penis or terminal organ (Fig. 26).

**Spermatophoric duct** – Male duct that serves the function to transfer the spermatophores from the spermatophoric organ to the Needham's sac (Fig. 26).

**Spermatophoric sac** – See **Needham's sac**.

**Spine** – See **Rostrum**.

**Stalk of tentacle** – Region of the tentacle proximal to the club.



(after Grieb, 1976)

Fig. 26 male squid reproductive apparatus

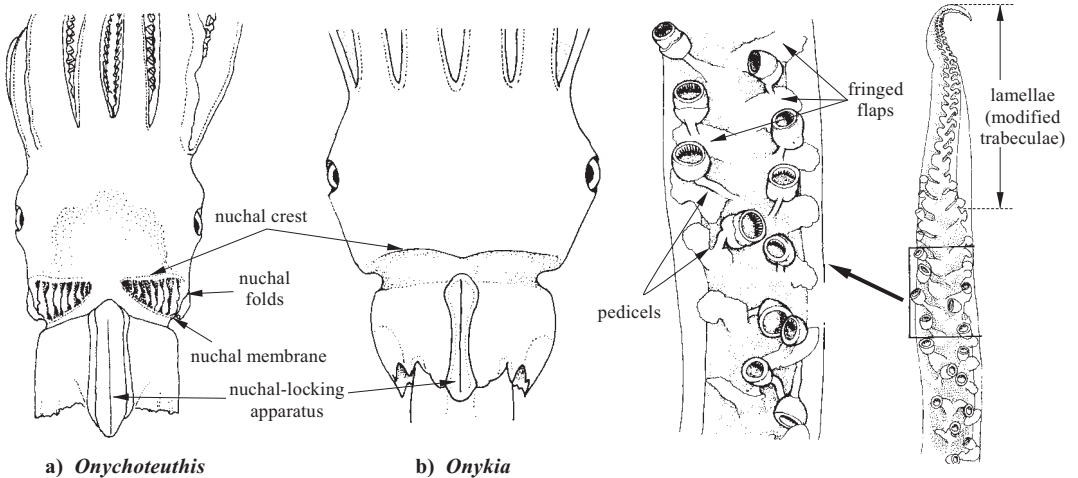


Fig. 27 nuchal folds and nuchal crest

Fig. 28 hectocotylied arm of males

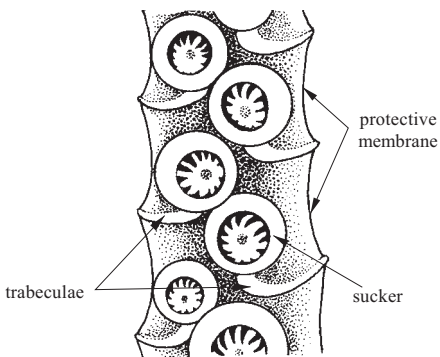


Fig. 29 trabeculae, protective membranes and suckers on arm of squid

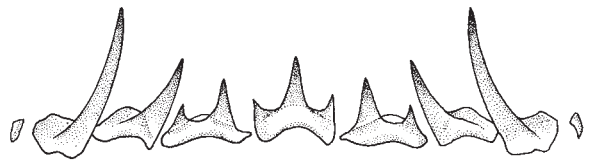
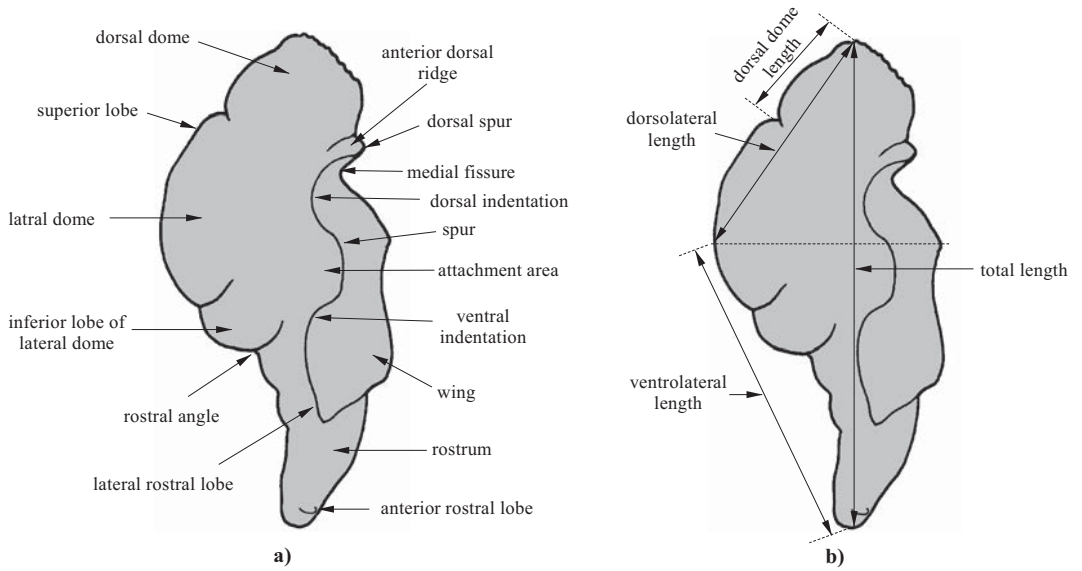
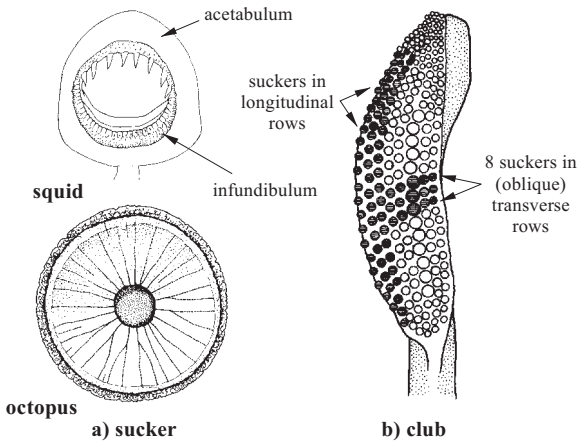


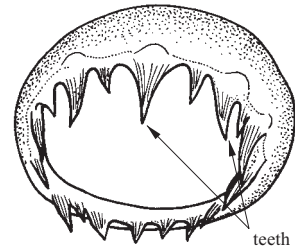
Fig. 30 radula (transverse row of teeth)



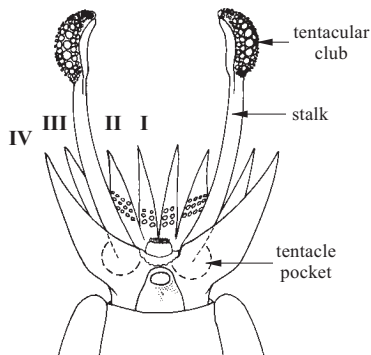
**Fig. 31 diagrams of a generalized teuthoid statolith (anterior view) with a) basic terms and b) basic dimensions labelled**  
(after Clarke, 1978)



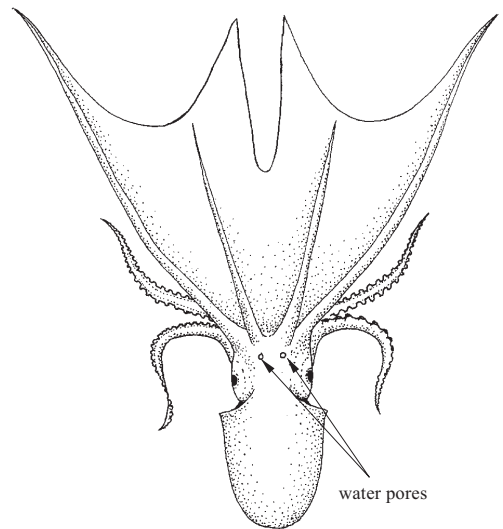
**Fig. 32 squid and octopus sucker and squid sucker orientation**



**Fig. 33 sucker ring**



**Fig. 34 diagrammatic sketch of arms and tentacles of decapods other than mysoid and oegopsid squids**



**Fig. 35 *Tremoctopus* (dorsal view)**

**Stalked eyes** – Eyes that extend from the head on stalks. Two types exist: (1) stalked eyes in which the optic lobe is adjacent to the eye and separated from the brain by a long optic stalk and (2) stalked eyes in which the optic lobe remains adjacent to the brain and long optic nerves extend from the lobe to the eye. The former type is found exclusively in the Cranchiidae.

**Statocyst(s)** – A paired sense-organ that detects gravity, angular accelerations and low-frequency sounds. Statocysts are embedded within the cephalic cartilage and contain the statoliths.

**Statolith(s)** – A calcareous stone within the statocyst (Fig. 31). Statoliths of many species can be used for age determination.

**Stellate ganglion** – Major ganglion of the peripheral nervous system that controls nerves to the mantle muscles.

**Stylet(s)** – A pair of rod-like structures considered remains of the molluscan shell in incirrate octopods. Generally in the form of a slender, cartilage-like, pointed rod tightly surrounded by the shell sac and buried in the mantle muscle on either side of the mantle.

**Subadult** – Stage at which all of the characters that typically define the species are present, but the reproductive system is not mature and functional. It follows the juvenile stage and precedes the adult stage. A subadult stage is defined in cephalopods because the adult phase often is temporally abbreviated.

**Subequal** – Nearly equal. Generally refers to the length of the arms when these appear to be approximately the same length. Arm lengths cannot be measured very accurately due to variation in their states of contraction. Also used for sucker diameters.

**Sucker** – Muscular suction-cup on the arms and tentacles and occasionally on the buccal supports. It consists of a cup-shaped portion, the **acetabulum**, and a flat, distal ring, the **infundibulum** that contact the substrate (Fig. 32a). Some are stalked, placed on muscular rods that contract (cuttlefishes and squids); some are sessile, embedded without stalks on the oral surface of the arms (octopuses). Suckers of decapodiforms contain horny rings that often bear teeth (Fig. 33) or sometimes form hooks. They usually are counted either in longitudinal or in transverse (oblique) rows. In octopods suckers are counted in longitudinal rows.

**Sucker ring** – Chitinous, often serrate or toothed, ring that encircles the opening of suckers of cuttlefishes and squids (Fig. 33).

**Sucker series** – The longitudinal rows of suckers on cephalopod appendages sometimes are called 'series'. In these cases 'series' (= longitudinal rows) contrast with 'rows' (= transverse rows) in describing suckers arrangement. In octopods, the term 'series' generally is synonymous with 'rows', the 'longitudinal' component of the term being implied.

**Sucker stalk** – See **Pedicel**.

**Sucker teeth** – Teeth on the inner, horny sucker rings of some decapodiforms.

**Swimming membrane** – See **Keel**.

**Tail** – Posterior narrow extension of the body posterior to the fins. The end of the fins and the beginning of the tail often overlap. An operational definition for point of demarcation for the purposes of measurement is: the point where a hypothetical line, continuous with the broad posterior edge of the fin, crosses the midline of the body (Fig. 1).

**Tentacle(s)** – Modified fourth pair of arms in Decapodiformes that are capable of considerable extension and contraction. Each tentacle consists of a proximal stalk usually devoid of suckers, and a distal club armed with suckers and occasionally hooks.

**Tentacle pocket** – A pocket that encompasses the base of each tentacle at its fusion with the head and provides space for complete retraction of the tentacle into the pocket (as in members of the Sepioidea and 'sepoid squids'), or contraction of the tentacular stalk without retraction into the pocket (as in the true squids) (Fig. 34).

**Tentacular club** – The terminal, usually expanded part of the tentacle which bears suckers and/or hooks (Fig. 7).

**Terminal fins** – Fins with more than 50% of their length posterior to the muscular mantle. These fins, therefore, are at the “terminal” or posterior end of the body and are generally supported by elongate secondary conus of the gladius.

**Terminal organ** – Alternative name for penis, as true definition of a penis is ‘organ of insertion’.

**Terminal pad (of tentacular club)** – A small, distinct pad or circlet of suckers at the tip of the club (Figs 7, 32a).

**Trabeculae** – Muscular cones or flaps that support the protective membranes on the arms and tentacular clubs in decapodiforms (Fig. 29).

**Tragus** – Particular inward projecting knob on the medial surface of the central depression in the funnel locking cartilage of some squids (Fig. 3).

**Truncate teeth** – Teeth on the inner horny of rings of decapodiforms suckers that do not terminate in a point but rather a broad, flat tip.

**Vane** – Broad, lateral portion of the gladius that arises from the rachis (Fig. 11).

**Ventral** – Toward the lower surface of the animal (i.e. the side on which the funnel is located) (Fig. 15).

**Vesicular tissue** – Tissues found in some decapodiforms that contain numerous vesicles filled with water that usually contains ammonium chloride. The vesicles may be concentrated in certain structures (e.g. the ventral arms) or scattered throughout the animal. The light solution in the vesicles provides buoyant lift.

**Water pores** – One or 2 pairs of pores in the integument of the head that communicate with extensive spaces at the bases of arms on some pelagic octopods (e.g. *Tremoctopus*) (Fig. 35).

**Web** – A membranous or muscular sheet that extends between the arms of many octopods but is reduced or absent in most decapods.

**KEY TO FAMILIES OCCURRING IN THE AREA**

- 1a. Suckers stalked with chitinous rings; usually 10 circumoral appendages (8 arms and 2 tentacles; tentacles may be lost in some species) . . . . . **Cuttlefishes, Bobtail squids, Bottletail squids, Pigmy squids, Ram’s Horn squids, Myopsid squids, Oegopsid squids → 2**
- 1b. Suckers without stalks (but suckers bases may be constricted in cirrate octopods and *Vampyroteuthis*) and without chitinous rings; 8 arms but no tentacles . . . . . **Octopods and Vampires → 26**
- 2a. Internal shell calcified, either straight and laminate, or coiled and chambered . . . . . → 3
- 2b. Internal shell (gladius) present (rudimentary in Sepiolidae), chitinous . . . . . → 4
- 3a. Internal shell coiled, chambered . . . . . **Ram’s Horn squids, Family Spirulidae (Fig. 36)**
- 3b. Internal shell straight, laminate, chalky . . . . . **Cuttlefishes, Family Sepiidae (Fig. 37)**

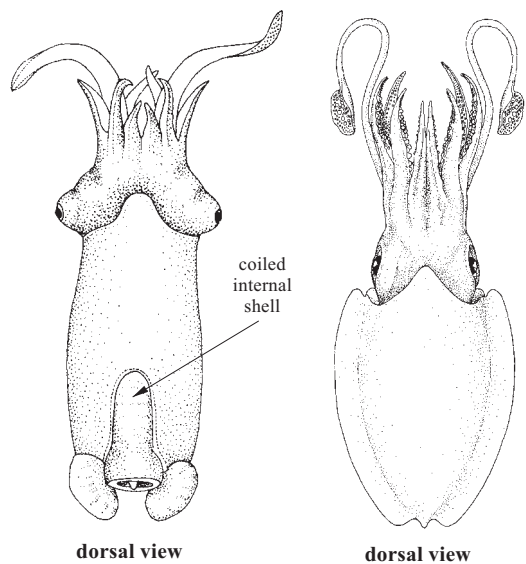


Fig. 36 Spirulidae (*Spirula*) Fig. 37 Sepiidae (*Sepia*)

4a. Internal shell (gladius or pen) chitinous and rudimentary or absent; tentacles retractile into pockets between arms III and IV . . . . . **Bobtail squids, Family Sepiolidae (Fig. 38)**

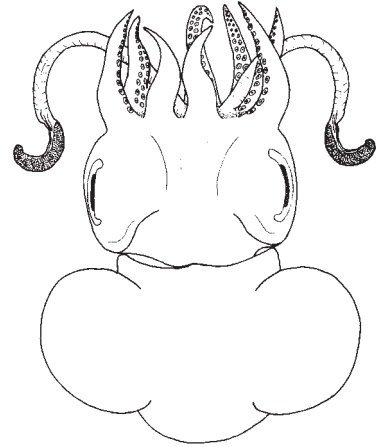
4b. Internal shell straight, feather-shaped or pen-shaped; tentacles contractile, not retractile, into pockets . **Myopsid and Oegopsid squids → 5**

5a. Eye covered by a transparent membrane (cornea) (Fig. 39a) . . . . . **Myopsid squids, Family Loliginidae (Fig. 40)**

5b. Eye without cornea; lens in open contact with seawater (Fig. 39b) . . . . . **Oegopsid squids → 6**

6a. Mantle articulates with funnel and head; funnel-mantle locking apparatus and nuchal cartilages present . . . . . → 7

6b. Mantle fused to funnel ventrally and to head dorsally; funnel-mantle locking apparatus and nuchal cartilages absent<sup>2/</sup> (Fig. 41) . . . . . **Cranchiidae**



dorsal view

Fig. 38 Sepiolidae (*Rossia*)

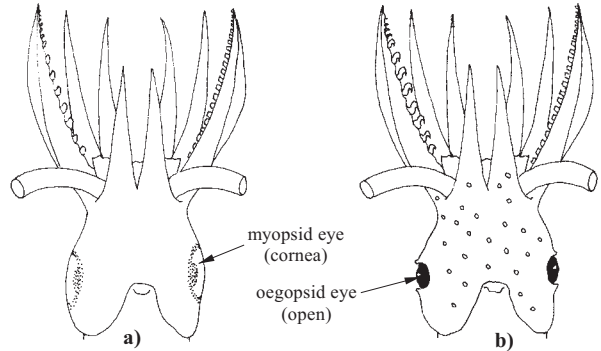


Fig. 39

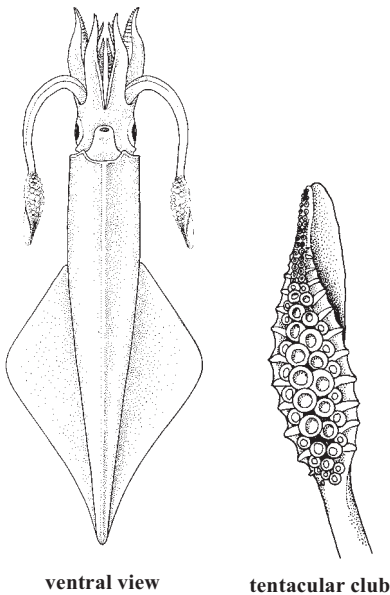


Fig. 40 Loliginidae (*Loligo*)

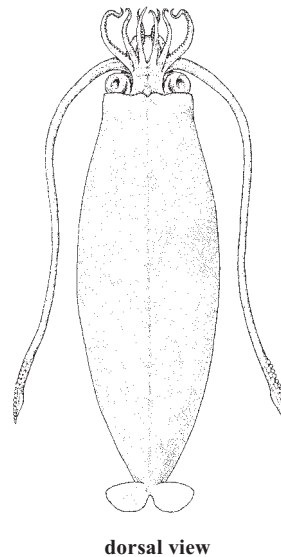


Fig. 41 Cranchiidae (*Helicocranchia*)

<sup>2/</sup> Mantle fused to funnel ventrally but free from head dorsally in *Grimalditeuthis*.



- 7a. Funnel-mantle locking apparatus a simple, more or less straight groove and ridge (Fig. 42a) . . . . . → **8**
- 7b. Funnel-mantle locking apparatus not a simple straight groove and ridge (Fig. 42b-f) . . . . . → **21**

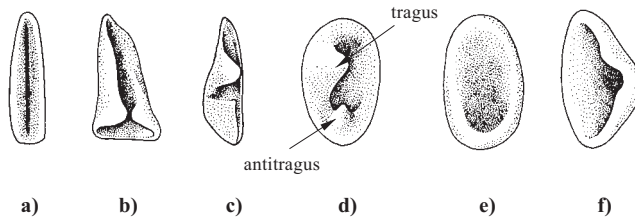


Fig. 42 funnel-locking cartilage

- 8a. Arms with hooks . . . . . → **9**
- 8b. Arms without hooks . . . . . → **12**
- 9a. Tentacles and clubs absent in adults; present in paralarvae and occasionally in juveniles (*Taningia*); when present, clubs rudimentary, with few suckers . . . . . **Octopoteuthidae** (Fig. 43)
- 9b. Tentacles present, with fully developed clubs . . . . . → **10**
- 10a. Photophores on viscera but not on surface of mantle head or arms . . . **Pyroteuthidae** (Fig. 44)
- 10b. Photophores on surface of mantle, head or arms but not on viscera . . . . . → **11**

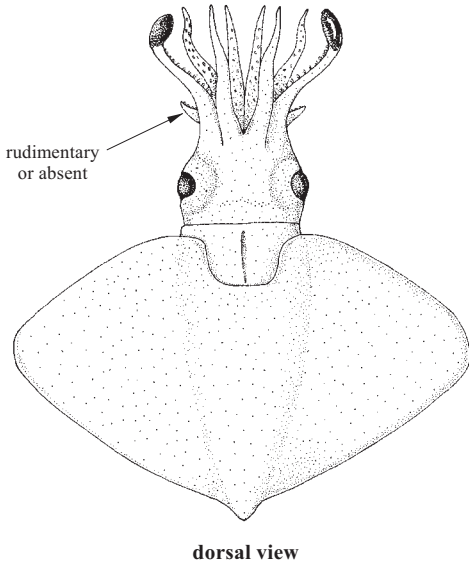


Fig. 43 Octopoteuthidae (*Taningia*)

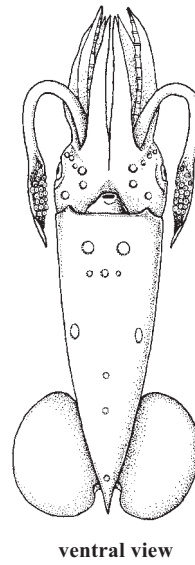
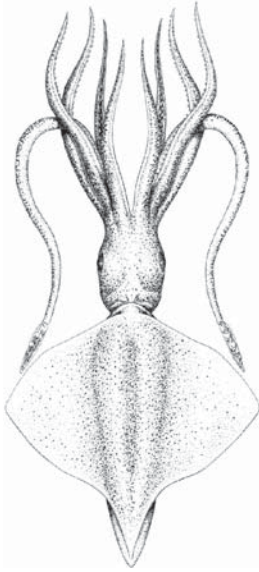


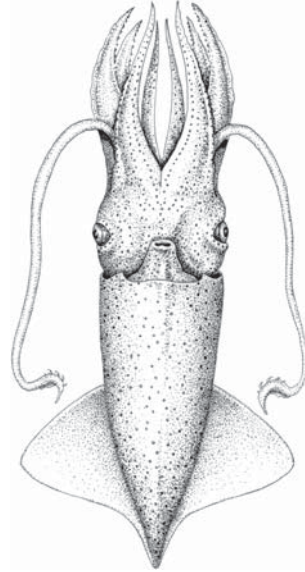
Fig. 44 Pyroteuthidae (*Pterygioteuthis*)

- 11a. Photophores on tentacles but not on eyeballs . . . . . **Ancistrocheiridae (Fig. 45)**
- 11b. Photophores on ventral eyeballs but not on tentacles . . . . . **Enoploteuthidae (Fig. 46)**



dorsal view

Fig. 45 Ancistrocheiridae (*Ancistrocheirus*)



dorsal view

Fig. 46 Enoploteuthidae (*Abralia*)

- 12a. Buccal membrane connectives attach to the ventral sides of ventral arms (Fig. 47b). . . . . → 13
- 12b. Buccal membrane connectives attach to the dorsal sides of ventral arms (this character may be difficult to detect in some histioteuthids) (Fig. 47a). . . . . → 17
- 13a. Hooks present on tentacular clubs (Fig. 48a and b) (tentacles and clubs lost in adults) (Fig. 48c) . . . . . **Onychoteuthidae**
- 13b. Hooks lacking on tentacular clubs . . . . . → 14

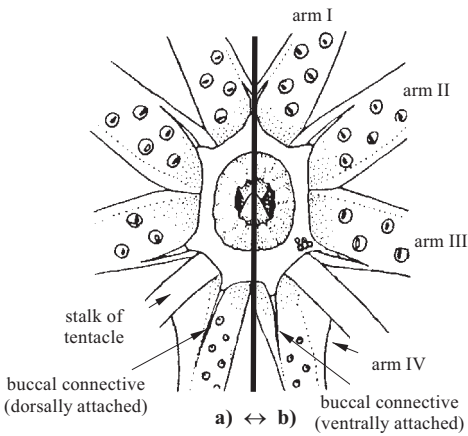


Fig. 47 oral view

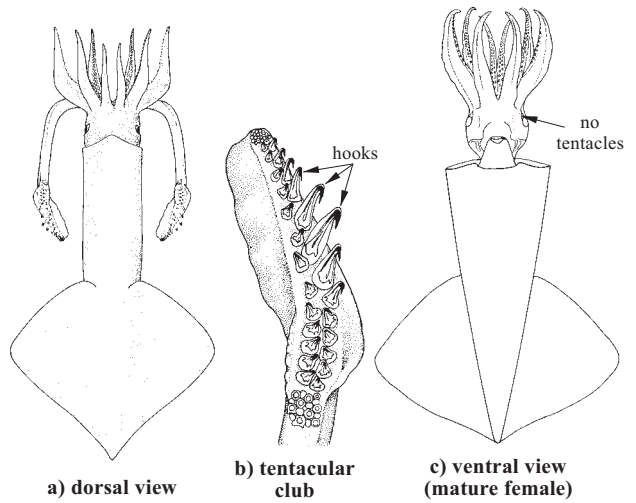


Fig. 48 Onychoteuthidae (*Onychoteuthis*)

- 14a. Cartilaginous scales (sometimes minute) present on mantle; club suckers in 4 longitudinal series . . . . . → 15
- 14b. Cartilaginous scales lacking; club suckers in more than 4 longitudinal series in some areas . . . . . → 16
- 15a. Tentacles present, with numerous laterally compressed suckers . . . **Pholidoteuthidae** (Fig. 49)
- 15b. Tentacles lost in adults, small and weak in juveniles, with few (about 6) poorly differentiated suckers . . . . . **Lepidoteuthidae** (Fig. 50)

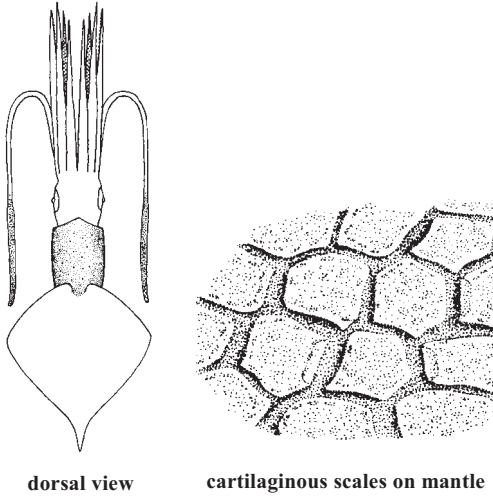


Fig. 49 Pholidoteuthidae (*Pholidoteuthis*)

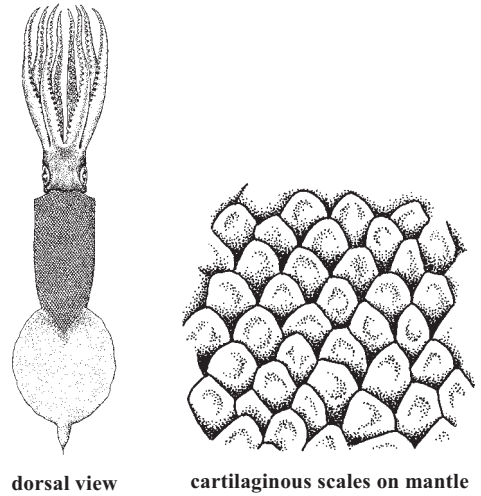


Fig. 50 Lepidoteuthidae (*Lepidoteuthis*)

- 16a. Fins nearly as long as mantle, supported by strong, transverse, muscular ribs; minute suckers present on oral surface of buccal membrane . . . . . **Ctenopterygidae** (Fig. 51)
- 16b. Fins less than half mantle length, without supporting ribs; no suckers on buccal membrane . . . . . **Brachioteuthidae** (Fig. 52)

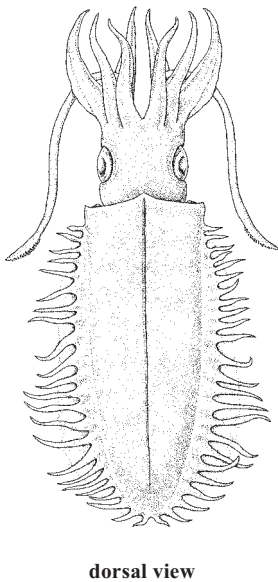


Fig. 51 Ctenopterygidae (*Ctenopteryx*)

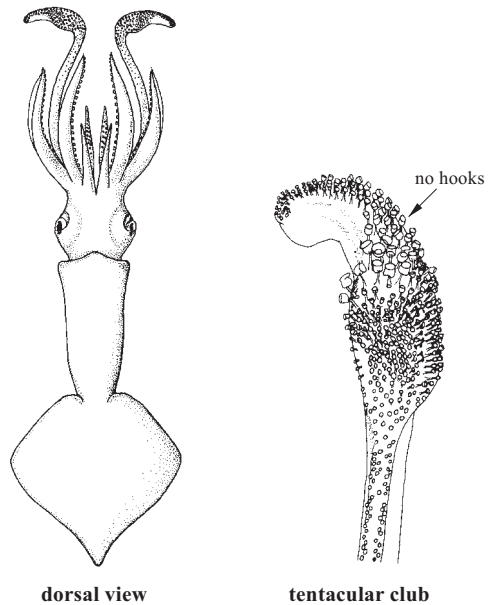


Fig. 52 Brachioteuthidae (*Brachioteuthis*)

17a. Single row of photophores on ventral surface of eye; buccal membrane with 8 lappets . . . **Lycoteuthidae** (Fig. 53)

17b. No photophores on eyes; buccal membrane with 7 lappets or less . . . . . → 18

18a. Surface of mantle, head and arms covered with numerous photophores, usually large and distinct . . . . . **Histioteuthidae** (Fig. 54)

18b. Surface of mantle and head without photophores (a few photophores may be present on arms) . . . . . → 19

19a. Minute suckers present on oral surface of buccal membrane (Fig. 55) . . . . . **Bathyteuthidae**

19b. No suckers on oral surface of buccal membrane . . . . . → 20

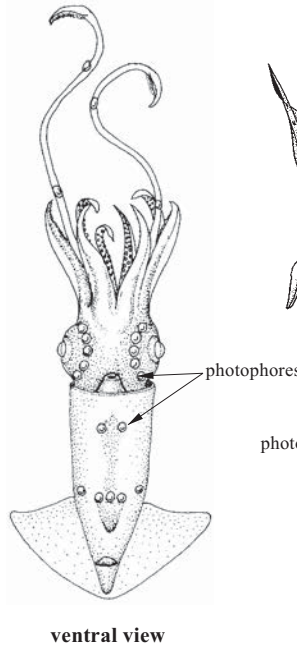


Fig. 53 Lycoteuthidae (*Lycoteuthis*)

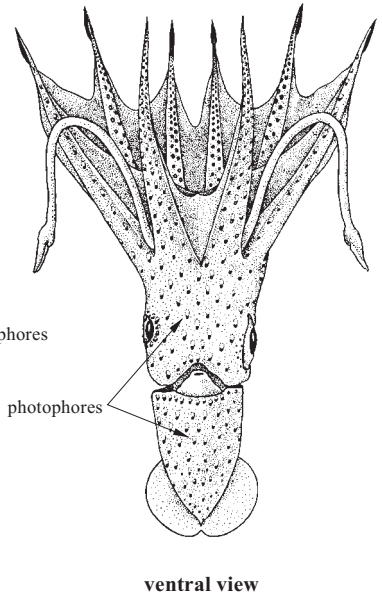


Fig. 54 Histioteuthidae (*Histioteuthis*)

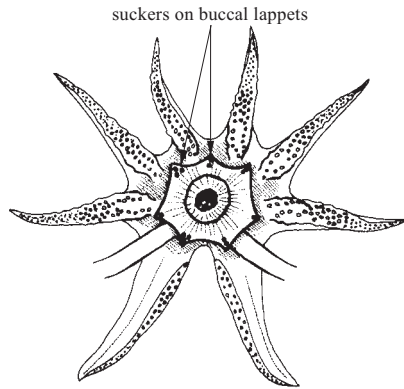
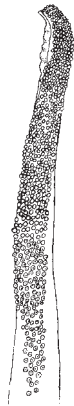
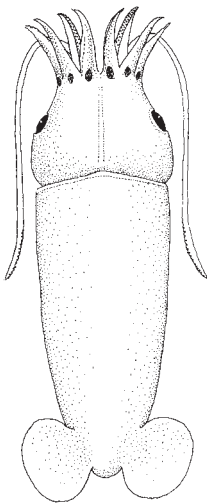
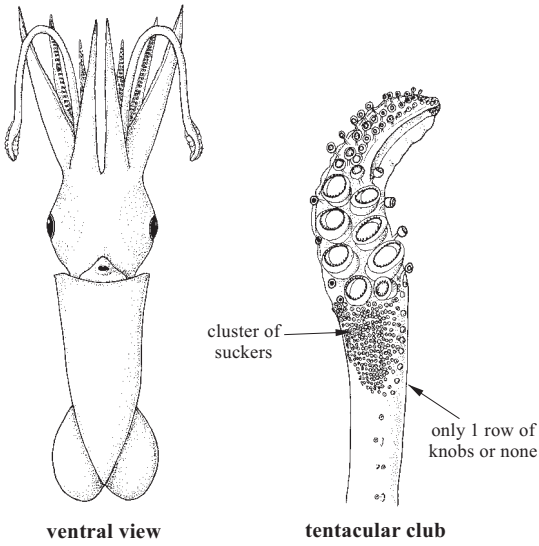
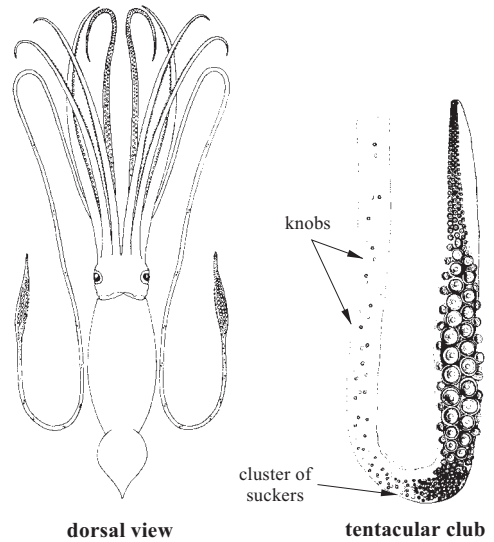


Fig. 55 Bathyteuthidae (*Bathyteuthis*)

- 20a.** Posterior borders of fins convex; carpal knobs in a single dorsal row or absent; adults not gigantic (Fig. 56) . . . . . **Neoteuthidae**
- 20b.** Posterior borders of fins concave; carpal knobs in a cluster alternating with suckers and extending almost to base of tentacle; attains gigantic size (Fig. 57) . . . . . **Architeuthidae**

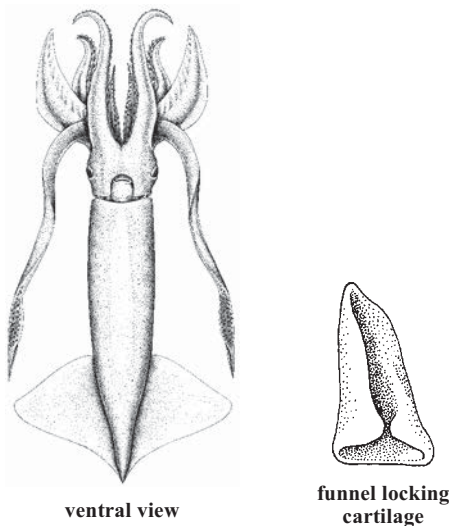


ventral view                      tentacular club  
**Fig. 56 Neoteuthidae (*Alluroteuthis*)**

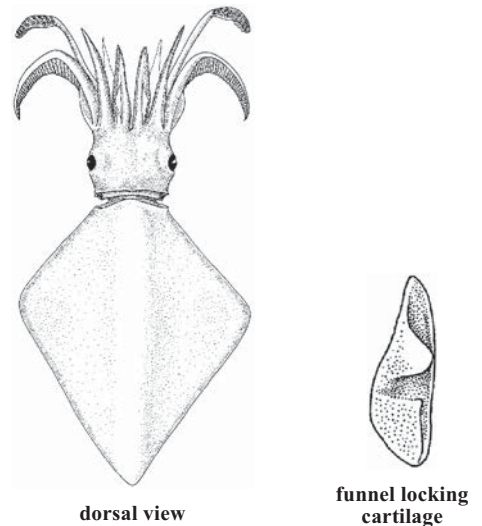


dorsal view                      tentacular club  
**Fig. 57 Architeuthidae (*Architeuthis*)**

- 21a.** Funnel-locking cartilage with longitudinal and transverse grooves ⊥-shaped or -| shaped (Fig. 42b and c) . . . . . → **22**
- 21b.** Funnel-locking cartilage triangular or oval, with or without inward projecting knobs . . . . . → **23**
- 22a.** Funnel-locking cartilage with longitudinal groove crossed by a transverse groove at its posterior end, ⊥-shaped (Fig. 42b); fins less than 60% mantle length (Fig. 58) . . . . . **Ommastrephidae**
- 22b.** Funnel-locking cartilage with longitudinal groove from which a shorter groove branches medially, -| shaped (Fig. 42c); fins more than 80% mantle length (Fig. 59) . . . . . **Thysanoteuthidae**



ventral view                      funnel locking cartilage  
**Fig. 58 Ommastrephidae (*Ommastrephes*)**



dorsal view                      funnel locking cartilage  
**Fig. 59 Thysanoteuthidae (*Thysanoteuthis*)**

- 23a. Funnel locking apparatus oval with posterior shelf or 1 or 2 knobs projecting inward (Fig. 42d). . . . . → 24
- 23b. Funnel locking apparatus oval or subtriangular, without shelf or knobs (Fig. 42e, f). . . . . → 25
- 24a. Club suckers in 4 longitudinal rows . . . . . **Chiroteuthidae** (Fig. 60)
- 24b. Club suckers minute, in more than 15 longitudinal rows . . . . . **Mastigoteuthidae** (Fig. 61)
- 25a. Arm suckers in 4 to 6 longitudinal rows; tail extremely long, greater than mantle length; arms very long . . . . . **Joubiniteuthidae** (Fig. 62)
- 25b. Arm suckers in 2 longitudinal rows; tail short, less than half mantle length, or absent . . . . . **Cycloteuthidae** (Fig. 63)

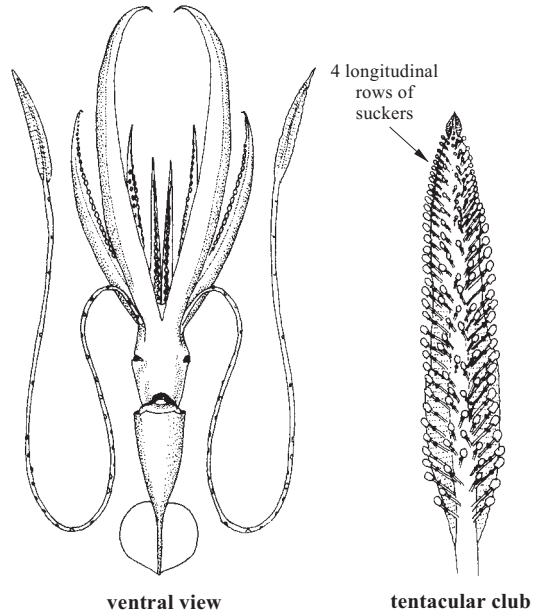


Fig. 60 Chiroteuthidae (*Chiroteuthis*)

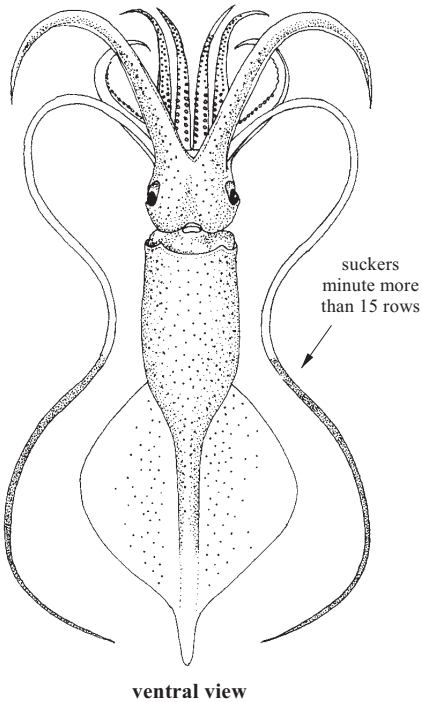


Fig. 61 Mastigoteuthidae (*Mastigoteuthis*)

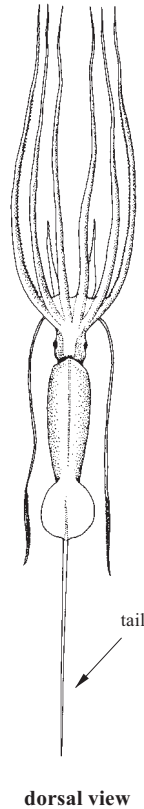


Fig. 62 Joubiniteuthidae (*Joubiniteuthis*)

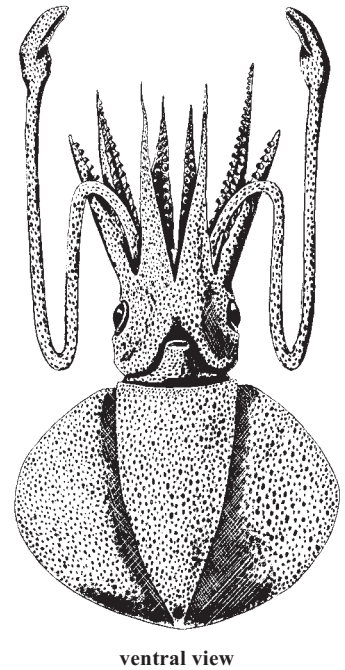


Fig. 63 Cycloteuthidae (*Discoteuthis*)

- 26a. Filamentous appendages present in pouches between bases of dorsal and dorsolateral arms; photophores present at base of each fin; colour dark maroon to black . . . . . **Vampires (monotypic), Family Vampyroteuthidae (Fig. 64)**
- 26b. Filaments and photophores absent; colour variable to dark maroon, never black . . . . . **Octopods → 27**
- 27a. Fins present; cirri on arms . . . . . **Cirrate Octopods → 28**
- 27b. Fins and cirri absent . . . . . **Incirrate Octopods → 30**
  
- 28a. Short cirri and no secondary webs, body axis strongly compressed in anteroposterior plane . . . . . **Opisthoteuthidae (Fig. 65)**
- 28b. Long cirri and secondary webs, body axis not compressed in anteroposterior plane . . . . . **→ 29**

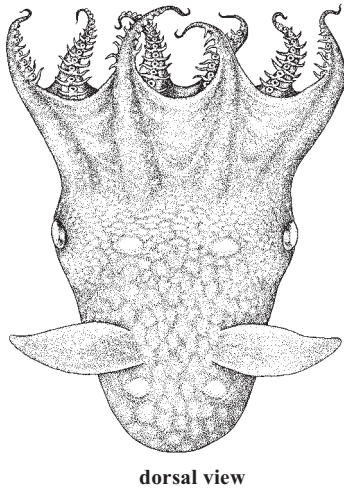


Fig. 64 Vampyroteuthidae (*Vampyroteuthis*)

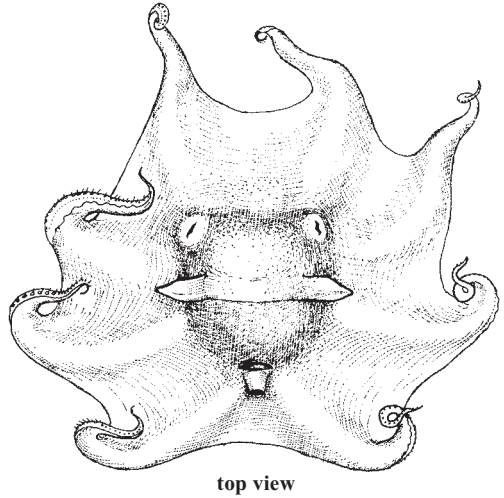


Fig. 65 Opisthoteuthidae (*Opisthoteuthis*)

- 29a. Shell (cartilaginous fin support) U-shaped . . . . . **Stauroteuthidae (Fig. 66)**
- 29b. Saddle-shaped shell . . . . . **Cirroteuthidae (Fig. 67)**

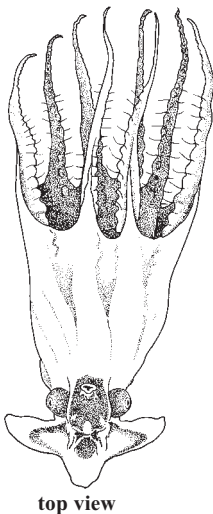


Fig. 66 Stauroteuthidae (*Stauroteuthis*)

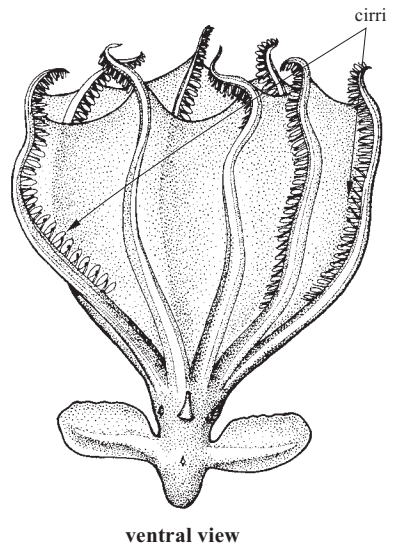


Fig. 67 Cirroteuthidae (*Cirrothauma*)

- 30a. Muscle tissue of body of gelatinous consistency but not transparent or gelatinous and transparent . . . . . → 31
- 30b. Muscle tissue of body firm (may be covered by gelatinous subdermal layer) . . . . . → 34
  
- 31a. Shell (internal cartilaginous support U-shaped); suckers biserial distal to edge of web . . . . . **Alloposidae** (Fig. 68)
- 31b. Without internal shell; suckers uniserial along entire length of arms . . . . . → 32
  
- 32a. Eyes tubular. . . . . **Amphitretidae**<sup>3/</sup> (Fig. 69)
- 32b. Eyes not tubular. . . . . → 33

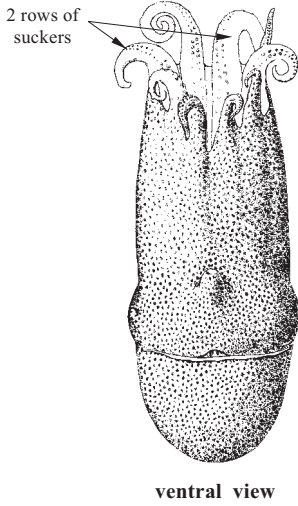


Fig. 68 Alloposidae (*Haliphron*)

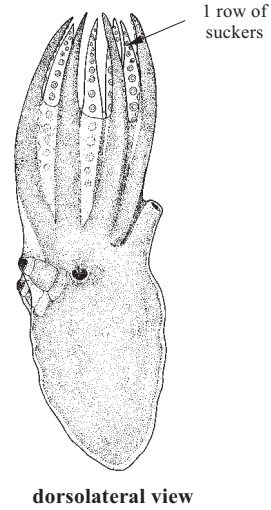


Fig. 69 Amphitretidae (*Amphitretus*)

- 33a. Digestive gland very elongate, spindle-shaped, pointed at one end . . **Vitreledonellidae**<sup>3/</sup> (Fig. 70)
- 33b. Digestive gland oblong, not pointed at end . . . . . **Bolitaenidae**<sup>3/</sup> (Fig. 71)

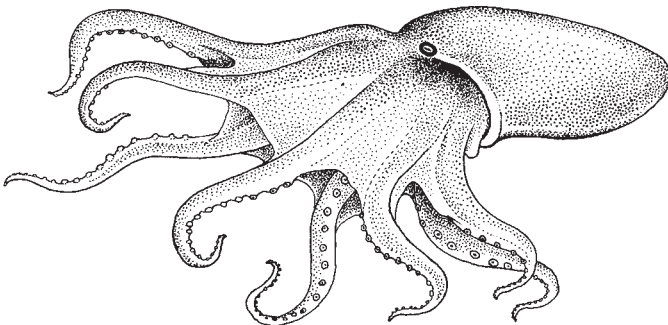


Fig. 70 Vitreledonellidae (*Vitreledonella*)

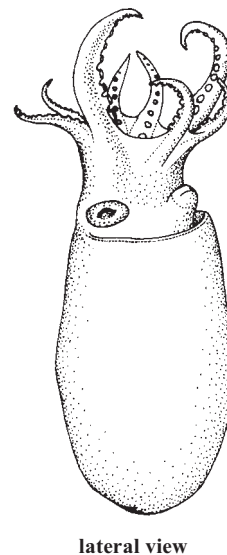
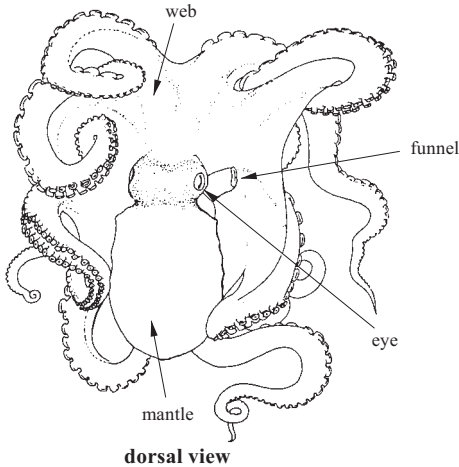


Fig. 71 Bolitaenidae (*Japetella*)

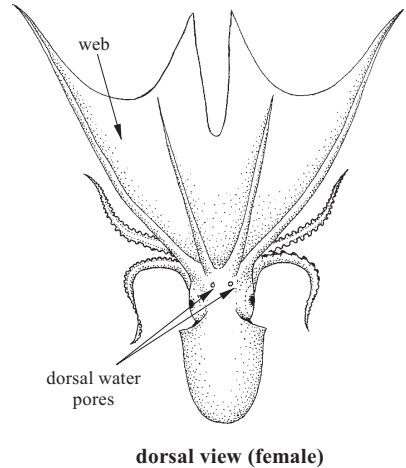
<sup>3/</sup> At the time of going to press, Strugnell *et al.* (2013) used molecular evidence to merge the families Amphitretinae, Bolitaeninae and Vitreledonellinae into a single family, Amphitretidae.



- 34a. Males and females about the same size; hectocotylized left or right III arm, never in pocket; funnel locking apparatus absent; no water pores on head . . . . . **Octopodidae**<sup>4/</sup> (Fig. 72)
- 34b. Dwarf males very much smaller than females; hectocotylized left III arm temporarily coiled in sac below eye, with extremely long filamentous tip; funnel locking apparatus present . . . . . → 35
- 35a. Water pores present on head at bases of both dorsal and ventral arms; dorsal and dorsolateral arms of female joined by thin, very deep web . . . . . **Tremoctopodidae** (Fig. 73)
- 35b. Dorsal water pores absent; web, when present, not as above . . . . . → 36

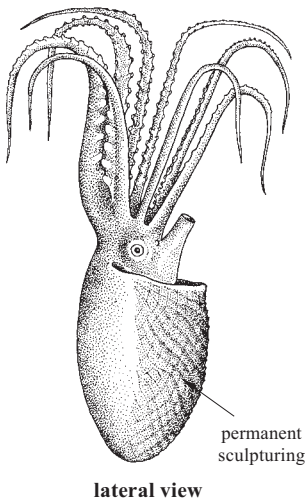


**Fig. 72 Octopodidae (*Octopus*)**

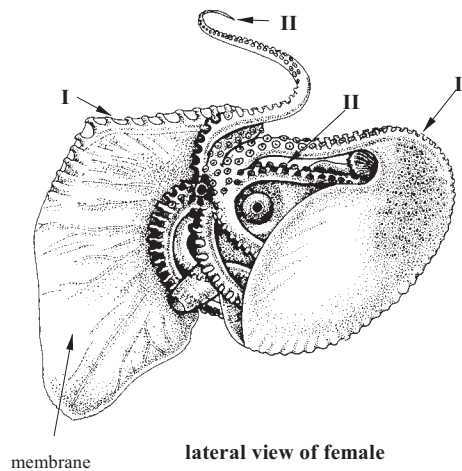


**Fig. 73 Tremoctopodidae**

- 36a. Females with permanent reticulate sculpturing of ventral mantle; dorsal arms of female normal, without flap; no shell-like egg case; males with hectocotylus in stalked sac beneath eye . . . . . **Ocythoidae** (Fig. 74)
- 36b. Dorsal arms of females with broad, membranous flap that secretes and holds a thin, shell-like egg case; males with hectocotylus in non-stalked sac beneath eye . . . . . **Argonautidae** (Fig. 75)



**Fig. 74 Ocythoidae (*Ocythoe*)**



**Fig. 75 Argonautidae**

<sup>4/</sup> At the time of going to press, Strugnell *et al.* (2013) published a major revision of the familial level classification of the incirrate octopods. They establish six families: Octopodidae, Bathypolypodidae, Eledonidae, Enteroctopodidae, Megaleledonidae and Amphitretidae.

## LIST OF FAMILIES AND SPECIES OCCURRING IN THE AREA

The symbol ♀ is given when species accounts are included.

### CUTTLEFISHES, BOBTAIL SQUIDS AND RAM'S HORN SQUID

#### Family SEPIIDAE

- ♀ *Sepia australis* Quoy and Gaimard, 1832.
- ♀ *Sepia bertheloti* d'Orbigny, 1835.
- ♀ *Sepia elegans* Blainville, 1827.
- ♀ *Sepia elobyana* Adam, 1941.
- ♀ *Sepia hieronis* (Robson, 1924).
- ♀ *Sepia hierredda* Rang, 1835.
- ♀ *Sepia officinalis* Linnaeus, 1758.
- ♀ *Sepia orbignyana* Férussac in d'Orbigny, 1826.
- ♀ *Sepia vermiculata* Quoy and Gaimard, 1832.
- ♀ *Sepiella ornata* (Rang, 1837).

#### Family SEPIOLIDAE

- ♀ *Austrorossia mastigophora* (Chun, 1915).
- ♀ *Heteroteuthis dispar* (Rüppell, 1844).
- ♀ *Neorossia caroli* (Joubin, 1902).
- ♀ *Rondeletiola minor* (Naef, 1912).
- ♀ *Rossia macrosoma* (Delle Chiaje, 1830).
- ♀ *Sepietta oweniana* (d'Orbigny, 1840).
- ♀ *Sepiola atlantica* d'Orbigny, 1839-1842.
- ♀ *Sepiola aurantiaca* Jatta, 1896.
- ♀ *Sepiola knudseni* Adam, 1984.
- ♀ *Sepiola rondeletii* Leach, 1817.
- ♀ *Stoloteuthis leucoptera* (Verrill, 1878).

#### Family SPIRULIDAE

- ♀ *Spirula spirula* (Linnaeus, 1758).

### SQUIDS

#### MYOPSID SQUIDS

##### Family LOLIGINIDAE

- ♀ *Afrololigo mercatoris* (Adam, 1941).
- ♀ *Alloteuthis africana* Adam, 1950.
- ♀ *Alloteuthis media* (Linnaeus, 1758).
- ♀ *Alloteuthis subulata* (Lamarck, 1798).
- ♀ *Loligo forbesii* Steenstrup, 1856.
- ♀ *Loligo reynaudii* d'Orbigny, 1841.
- ♀ *Loligo vulgaris* Lamarck, 1798.

**OEGOPSID SQUIDS****Family ANCISTROCHEIRIDAE**

‡ *Ancistrocheirus lesueurii* (d'Orbigny 1842).

**Family ARCHITEUTHIDAE**

‡ *Architeuthis* Steenstrup, 1857.

**Family BATHYTEUTHIDAE**

‡ *Bathyteuthis abyssicola* Hoyle, 1885.

**Family BRACHIOTEUTHIDAE**

‡ *Brachioteuthis picta* Chun, 1910.

‡ *Brachioteuthis riisei* (Steenstrup, 1882).

**Family CHIROTEUTHIDAE**

‡ *Chiroteuthis veranyi* (Férussac, 1835).

‡ *Grimalditeuthis bonplandi* (Vérany, 1839).

‡ *Planctoteuthis danae* (Joubin, 1931).

‡ *Planctoteuthis exophthalmica* (Chun, 1908).

‡ *Planctoteuthis lippula* (Chun, 1908).

**Family CHTENOPTERYGIDAE**

‡ *Ctenopteryx canariensis* Salcedo-Vargas and Guerrero-Kommritz, 2000.

‡ *Ctenopteryx sicula* (Vérany, 1851).

**Family CRANCHIIDAE**

‡ *Bathothauma lyromma* Chun, 1906.

‡ *Cranchia scabra* Leach, 1817.

‡ *Egea inermis* Joubin, 1933.

‡ *Galiteuthis armata* Joubin, 1898.

‡ *Helicocranchia papillata* (Voss, 1960).

‡ *Helicocranchia pfefferi* Massy, 1907.

‡ *Leachia atlantica* (Degner, 1925).

‡ *Liguriella podophtalma* Issel, 1908.

‡ *Liocranchia reinhardtii* (Steenstrup, 1856).

‡ *Megalocranchia oceanica* (Voss, 1960).

‡ *Sandalops melancholicus* Chun, 1906.

‡ *Taonius pavo* (Lesueur, 1821).

‡ *Teuthowenia maculata* (Leach, 1817).

**Family CYCLOTEUTHIDAE**

‡ *Cycloteuthis sirventi* Joubin, 1919.

‡ *Discoteuthis discus* Young and Roper, 1969.

‡ *Discoteuthis laciniosa* Young and Roper, 1969.

**Family ENOPLOTEUTHIDAE**

- ‡ *Abralia redfieldi* Voss, 1955.
- ‡ *Abralia veranyi* (Rüppell, 1844).
- ‡ *Abraliopsis atlantica* Nesis, 1982.
- ‡ *Abraliopsis gilchristi* (Robson, 1924).
- ‡ *Abraliopsis morisii* (Vérany, 1839).
- ‡ *Enoplateuthis anapsis* Roper, 1964.
- ‡ *Enoplateuthis leptura leptura* (Leach, 1817).

**Family HISTIOTEUTHIDAE**

- ‡ *Histioteuthis arcturi* (Robson, 1948).
- ‡ *Histioteuthis bonnellii* (Férussac, 1834).
- ‡ *Histioteuthis celetaria celetaria* (Voss, 1960).
- ‡ *Histioteuthis corona corona* (Voss and Voss, 1962).
- ‡ *Histioteuthis macrohista* Voss, 1969.
- ‡ *Histioteuthis meleagroteuthis* (Chun, 1910).
- ‡ *Histioteuthis reversa* (Verrill, 1880).

**Family JOUBINITEUTHIDAE**

- ‡ *Joubiniteuthis portieri* (Joubin, 1916).

**Family LEPIDOTEUTHIDAE**

- ‡ *Lepidoteuthis grimaldii* Joubin, 1895.

**Family LYCOTEUTHIDAE**

- ‡ *Lampadioteuthis megaleia* Berry, 1916.
- ‡ *Lycoteuthis lorigera* (Steenstrup, 1875).
- ‡ *Selenoteuthis scintillans* Voss, 1959.

**Family MAGNAPINNIDAE**

- ‡ *Magnapinna talismani* (Fischer and Joubin, 1907).

**Family MASTIGOTEUTHIDAE**

- ‡ *Mastigoteuthis agassizii* Verrill, 1881.
- ‡ *Mastigoteuthis danae* (Joubin, 1933).
- ‡ *Mastigoteuthis glaukopsis* Chun 1908.
- ‡ *Mastigoteuthis hjorti* Chun, 1913.
- ‡ *Mastigoteuthis inermis* Rancurel, 1972.
- ‡ *Mastigoteuthis magna* Joubin, 1913.

**Family NEOTEUTHIDAE**

- ‡ *Narrowteuthis nesisi* Young and Vecchione, 2005.
- ‡ *Neoteuthis thielei* Naef, 1921.

**Family OCTOPOTEUTHIDAE**

- ‡ *Octopoteuthis danae* Joubin, 1931.
- ‡ *Octopoteuthis megaptera* (Verrill, 1885).
- ‡ *Octopoteuthis rugosa* Clarke, 1980.
- ‡ *Octopoteuthis sicula* Ruppell, 1844.
- ‡ *Taningia danae* Joubin, 1931.

**Family OMMASTREPHIDAE**

- ‡ *Eucleoteuthis luminosa* (Sasaki, 1915).
- ‡ *Hyaloteuthis pelagica* (Bosc, 1802)
- ‡ *Illex coindetii* (Vérany, 1839).
- ‡ *Ommastrephes bartramii* (Lesueur, 1821).
- ‡ *Ornithoteuthis antillarum* Adam, 1957.
- ‡ *Sthenoteuthis pteropus* (Steenstrup, 1855).
- ‡ *Todarodes angolensis* Adam, 1962.
- ‡ *Todarodes sagittatus* (Lamarck, 1798).
- ‡ *Todaropsis eblanae* (Ball, 1841).

**Family ONYCHOTEUTHIDAE**

- ‡ *Ancistroteuthis lichtensteini* (Férussac, 1835).
- ‡ *Onychoteuthis banksii* (Leach, 1817).
- ‡ *Onykia carriboea* Lesueur, 1821.
- ‡ *Onykia robsoni* (Adam, 1962).
- ‡ *Walvisteuthis virilis* Nesis and Nikitina, 1986.

**Family PYROTEUTHIDAE**

- ‡ *Pterygioteuthis gemmata* Chun, 1908.
- ‡ *Pterygioteuthis giardi* Fischer, 1896.
- ‡ *Pyroteuthis margaritifera* (Rüppell, 1844).

**Family THYSANOTEUTHIDAE**

- ‡ *Thysanoteuthis rhombus* Troschel, 1857.

**VAMPIRES****Family VAMPYROTEUTHIDAE**

- ‡ *Vampyroteuthis infernalis* Chun, 1903.

**CIRRATE OCTOPODS****Family CIRROTEUTHIDAE**

- ‡ *Cirroteuthis magna* Hoyle, 1885.

**Family OPISTHOTEUTHIDAE**

- ‡ *Grimpoteuthis boylei* Collins, 2003.
- ‡ *Grimpoteuthis wuelkeri* (Grimpe, 1920).
- ‡ *Opisthoteuthis calypso* Villanueva, Collins, Sánchez and Voss, 2002.
- ‡ *Opisthoteuthis grimaldii* (Joubin, 1903).
- ‡ *Opisthoteuthis massyae* (Grimpe, 1920).

**INCIRRATE OCTOPODS****Family ALLOPOSIDAE**

- ‡ *Haliphron atlanticus* Steenstrup, 1861.

**Family AMPHITRETIDAE**

- ‡ *Amphitretus pelagicus* Hoyle, 1885.

**Family ARGONAUTIDAE**

- ‡ *Argonauta argo* Linnaeus, 1758.
- ‡ *Argonauta hians* Lightfoot, 1786
- ‡ *Argonauta nodosus* Lightfoot, 1786.

**Family BOLITAENIDAE**

- ‡ *Bolitaena pygmaea* (Verrill, 1884).
- ‡ *Japetella diaphana* Hoyle, 1885.


**Family OCTOPODIDAE**

- ‡ *Amphioctopus burryi* (Voss, 1950).
- ‡ *Aphrodoctopus schultzei* (Hoyle, 1910).
- ‡ *Bathypolypus ergasticus* (P. Fischer and H. Fischer, 1892).
- ‡ *Bathypolypus sponsalis* (P. Fischer and H. Fischer, 1892).
- ‡ *Bathypolypus valdiviae* Thiele in Chun 1915.
- ‡ *Benthoctopus januarii* (Hoyle, 1885).
- ‡ *Callistoctopus macropus* (Risso, 1826).
- ‡ *Eledone caparti* Adam, 1950.
- ‡ *Eledone cirrhosa* (Lamarck, 1798).
- ‡ *Eledone moschata* (Lamarck, 1798).
- ‡ *Graneledone verrucosa* (Verrill, 1881).
- ‡ *Macrotritopus defilippi* (Vérany, 1851).
- ‡ *Octopus vulgaris* Cuvier, 1797.
- ‡ *Pteroctopus tetracirrhus* (Delle Chiaje, 1830).
- ‡ *Scaergus unicirrhus* (Delle Chiaje, 1841).

**Family OCYTHOIDAE**

- ‡ *Ocythoe tuberculata* Rafinesque, 1814.

**Family TREMOCTOPODIDAE**

 *Tremoctopus violaceus* Delle Chiaje, 1830.

**Family VITRELEDONELLIDIDAE**

 *Vitreledonella richardi* Joubin, 1918.

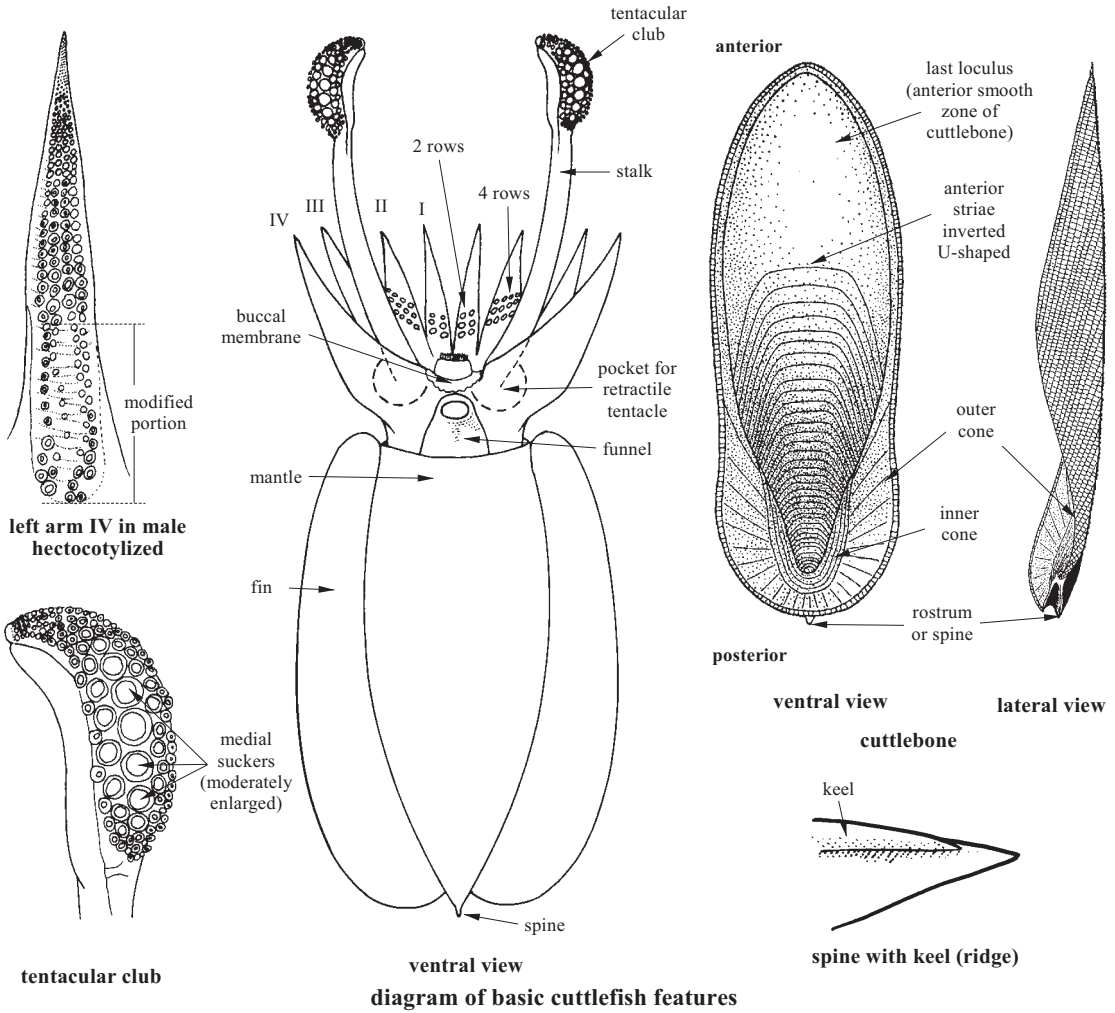
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SEPIIDAE

Cuttlefishes

**Diagnostic characters:** Mantle robust, slightly flattened dorsoventrally, may be broad or slender; oval in outline; anterior dorsal mantle margin projected forward, not fused with head. Fins narrow, located dorsolaterally on mantle, approximately equal to mantle length; **posterior fin lobes free**, not connected to each other. Head robust, slightly narrower than mantle; eyes prominent, covered by a transparent corneal membrane and a conspicuous secondary fold on the eyelid. Mouth surrounded by 10 appendages (8 arms, 2 tentacles). Arms with 2 to 4 suckers in transverse rows. Males with hectocotylized left ventral arm(s) IV for holding spermatophores; hectocotylus consists of a modified region of reduced suckers on either side of a swollen region, crenulated by transverse folds. Tentacular clubs with 4 or more suckers in transverse rows; **tentacles retractile into pockets on the ventrolateral sides of the head**. Arm and club suckers with chitinous rings. **Internal calcareous shell (cuttlebone) located dorsally under the skin**; cuttlebone shape ranges from lanceolate to oval; dorsal side a calcareous plate (dorsal shield); ventrally finely laminate, porous and consisting of thin, transverse septa supported by transverse calcareous rods. Buccal membrane present, with or without suckers; each radula tooth unicuspid (with a single projection). The colour is variable due to the great complex of chromatophores; browns, blacks, yellows and reds are the dominating colours.



ventral view diagram of basic cuttlefish features



**Size:** Up to 500 mm mantle length and 12 kg in weight.

**Habitat, biology, and fisheries:** On the continental shelf and upper slope to a maximum depth of approximately 1 100 m. Primarily bottom dwellers over a range of habitats, including rocky, sandy and muddy bottoms to seagrass, seaweed and coral reefs. Slower swimmers than the more streamlined squids. Able to attain neutral buoyancy by regulating the relative amounts of gas and fluid in the chambers of the cuttlebone; able to hover in midwater, with fins acting as stabilizers. Some species migrate seasonally in response to temperature changes and aggregate, usually in shallow water, at the time of spawning. Within a species, individuals may attain sexual maturity at very different sizes, depending upon the combined effects of temperature and light. Eggs, relatively few in number, are individually attached to various substrates in clusters; length of development varies with temperature. Life span (studied for *Sepia officinalis*) between 18 months and 2 years, though males may live longer; post-spawning mortality is high in females. Prey on a wide range of invertebrates and fish.

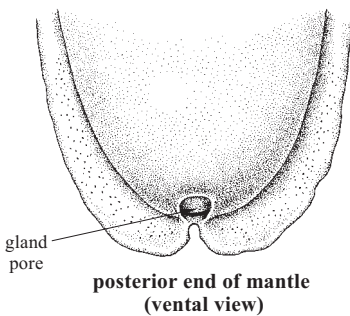
**Similar families occurring in the area**

The presence of a straight, laminate, calcified cuttlebone easily distinguishes the Sepiidae from the other families.

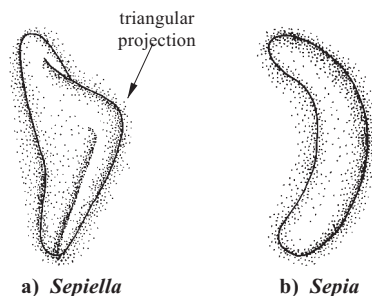
**Remarks:** There are still unresolved problems in the systematics of the genus *Sepia*. Khromov *et al.* (1998) placed *S. elegans* in the species complex *Rhombosepion*. However, Sanjuan *et al.* (1996), using allozyme electrophoresis on 3 species of *Sepia*, showed that *S. officinalis* and *S. elegans* belong to different genera: the first to the genus *Sepia sensu strictu* and the second to *Rhombosepion*. Resolution of this systematic problem has implications for a large number of other *Sepia* species and requires a larger study.

**Key to the species of Sepiidae occurring in the area**

- 1a. Posterior gland present on the ventral side of the posterior end of the mantle (Fig. 1), opening between fins; mantle-locking cartilage with triangular projection (Fig. 2a); cuttlebone without spine; outer cone wide posteriorly, with uncalcified edge; inner cone reduced, wide, flat, with short limbs . . . . . ***Sepiella ornata***
- 1b. Posterior gland absent; mantle-locking cartilage semicircular without triangular projection (Fig. 2b); cuttlebone not as above . . . . . **(genus *Sepia*) → 2**



posterior end of mantle (ventral view)  
**Fig. 1 *Sepiella***













a) *Sepiella*                      b) *Sepia*  
**Fig. 2 mantle-locking apparatus**

- 2a. Cuttlebone broadly to narrowly oval or rhomboidal anteriorly and oval posteriorly; inner cone with moderately wide limbs . . . . . → **4**
- 2b. Cuttlebone shape not as above; inner cone with narrow limbs . . . . . → **3**
- 3a. Cuttlebone narrowly drop-shaped; outer cone narrow, not forming posterior wings; spine long, with dorsal and ventral keels . . . . . ***Sepia australis***
- 3b. Cuttlebone oval, subrhomboidal, or tongue-shaped; outer cone well developed, usually with wide wings; spine present or absent, when present, usually without keels; cuttlebone posterior wings of outer cone absent or indistinct, not separated by deep notch from anterior part of cuttlebone; inner cone U- to V- shaped, with thick, sharply pointed limbs; arms of male subequal . . . . . → **8**

- 4a. Club suckers subequal, in 5 to 8 longitudinal series; cuttlebone ovally rhomboidal anteriorly, with slightly curved margins; spine of cuttlebone represented by blunt knob . . . . . ***Sepia elobyana***
- 4b. Club suckers distinctly unequal in size, in 7 or 8 longitudinal series; cuttlebone acuminate anteriorly; cuttlebone spine distinct and sharply pointed . . . . . → 5
- 5a. Medial club suckers 1.5 to 2.0 times larger than marginal suckers; cuttlebone width <33% length; posterior dorsal shield without excrescence . . . . . ***Sepia bertheloti***
- 5b. Medial club suckers 2 or 3 times larger than marginal suckers; cuttlebone width usually >33% cuttlebone length . . . . . → 6
- 6a. Medial club suckers 2.0 to 2.5 times larger than marginal suckers; adult mantle length usually about 150 mm; posterior spine surrounded by smooth, flat, chitinous excrescence . . . . . ***Sepia vermiculata***
- 6b. Medial club suckers 2.5 to 3.0 times larger than marginal suckers; adult mantle length usually more than 200 mm . . . . . → 7
- 7a. Cuttlebone very acuminate anteriorly, spine not covered with chitin in adults; hectocotylus usually with 8 to 14 rows of reduced suckers . . . . . ***Sepia hierredda***
- 7b. Cuttlebone slightly acuminate anteriorly, spine covered with chitin in adults; hectocotylus usually with 4 to 8 rows of reduced suckers . . . . . ***Sepia officinalis***
- 8a. Tentacular club suckers distinctly different in size . . . . . → 9
- 8b. Tentacular club suckers small and subequal . . . . . ***Sepia hieronis***
- 9a. Cuttlebone spine replaced by short, rugose, calcareous keel; 5 pairs of suckers at the base of I, II and III arms in females, 4 rows of suckers at the remaining parts of the arms, suckers on arms IV always quadriserial . . . . . ***Sepia elegans***
- 9b. Cuttlebone with long, distally prominent spine; arm suckers quadriserial along entire length . . . . . ***Sepia orbignyana***

#### List of species occurring in the area

The symbol  is given when species accounts are included.

-  *Sepia australis* Quoy and Gaimard, 1832.
-  *Sepia bertheloti* d'Orbigny, 1835.
-  *Sepia elegans* Blainville, 1827.
-  *Sepia elobyana* Adam, 1941.
-  *Sepia hieronis* (Robson, 1924).
-  *Sepia hierredda* Rang, 1837.
-  *Sepia officinalis* Linnaeus, 1758.
-  *Sepia orbignyana* Férussac in d'Orbigny, 1826.
-  *Sepia vermiculata* Quoy and Gaimard, 1832 .

 *Sepiella ornata* (Rang, 1837).

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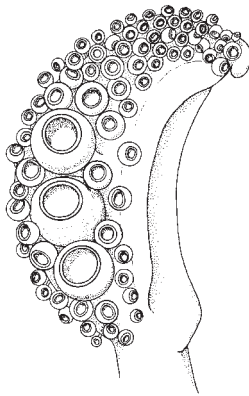
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***Sepia australis* Quoy and Gaimard, 1832**

**Frequent synonyms / misidentifications:** *Sepia capensis* Orbigny, 1845; *S. sinope* Gray, 1849 / None.

**FAO names:** **En** – Southern cuttlefish; **Fr** – Seiche australe; **Sp** – *Sepia australis*.

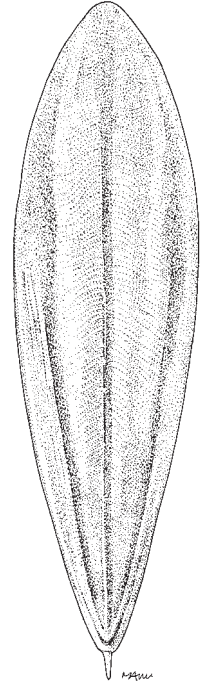
**Diagnostic characters:** Body elongate, oval, narrow and tapering anteriorly and posteriorly. Fins separated posteriorly. Arm suckers in 4 rows, the 2 median series much larger than the lateral ones. Left ventral arm of male hectocotyized over proximal two-thirds: 5 or 6 normal suckers at base, followed by 6 or 7 rows of minute suckers, the 2 dorsal series in normal position but 2 ventral series merged into a single series of 12 to 14 minute suckers on ventral protective membrane. Tentacular club short, slightly recurved, with suckers in transverse rows of 5, reducing to 4 proximally; **median 3 suckers greatly enlarged**, 1 or 2 others less so. Cuttlebone broadly lanceolate, somewhat oval anteriorly, sharply pointed posteriorly, **without posterior wings**. Striated zone with 3 deep, narrow longitudinal grooves. **Spine with dorsal keel** (barely discernible in juveniles) that extends for a short distance on the posterior part of the cuttlebone. **Intestinal light organ present.** **Colour:** brownish purple dorsally, with a narrow orange band along bases of fins; body equally heavily pigmented dorsally and ventrally.



tentacular club



dorsal view



ventral view

cuttlebone

**Size:** Maximum mantle length 85 mm, weight 50 g; females are larger and heavier than males.

**Habitat, biology, and fisheries:** A demersal species, abundant inside the 200 m isobath but recorded from 0 to 496 m. The most common sepiid off the west coast of Namibia and South Africa. *S. australis* apparently thrives in areas where O<sub>2</sub> concentrations are as low as 1.5 ml/l, which allows it to take advantage of oxygen-depleted shallow northern waters of the South African west coast, and to feed on one of its key prey species, the mantis shrimp. On the Agulhas Bank the higher bottom temperatures result in smaller mean size, affecting fecundity and abundance. In the wild this species feeds on crustaceans and euphausiids, fishes, and its own kind (*S. australis*); the incidence of cannibalism was low in summer off the west coast. *S. australis* continues to feed when sexually mature. This species is preyed upon by many species of fish, fur seals and also white-chinned petrels, probably by scavenging at the sea surface. Males may produce up to 360 spermatophores. *S. australis* prefers to spawn in deeper water of about 100 to 150 m. Not currently exploited commercially but important in the foodweb of the Benguela ecosystem.

**Distribution:** Northern Namibia, (17°30'S) to Rame Head, South Africa (31°47'S, 29°20'E).

**Remarks:** The record of 2 specimens from the Red Sea is erroneous.

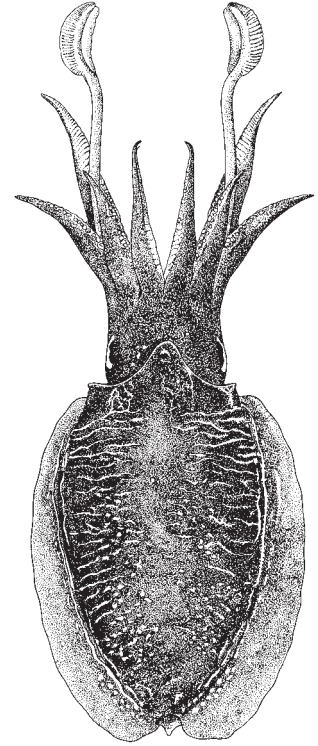
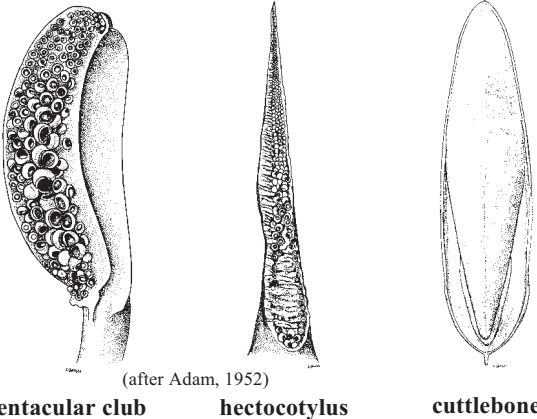


*Sepia bertheloti* d'Orbigny, 1835

**Frequent synonyms/ misidentifications:** *Sepia verrucosa* Lönberg, 1896; *S. mercatoris* Adam, 1937 / None.

**FAO names:** En – African cuttlefish; Fr – Seiche africaine; Sp – Sepia africana.

**Diagnostic characters:** Mantle more than 2 times longer than wide, its dorsal margin projecting strongly as a long, sharp angle. **Arms IV elongate.** **Left ventral arm hectocotylized with 2 to 5 normal suckers at base and 9 to 13 rows of minute, spaced-out suckers on its proximal third; dorsal protective membrane very broad.** Tentacular club slender, swimming keel not extended beyond base; protective membranes not united proximally and not extended onto stalk; suckers arranged in 8 oblique transverse rows, third in series slightly enlarged. Cuttlebone long oval, limbs of inner cone flat, narrow. **Spine present.** This species has **elongate tubercles along bases of fins with small, light-coloured patches laterally; males with a reddish stripe near lateral border of fins.** **Colour:** purplish brown.



**Size:** Maximum mantle length 180 mm in males and 130 mm in females.

**Habitat, biology, and fisheries:** A neritic, demersal species occurring predominantly on sandy to muddy bottoms on the continental shelf. From 20 to 160 m, mostly abundant between 25 and 65 m. The spawning season extends through summer and autumn. The species migrates to shallow waters during the spawning season. Females deposit about 50 to 100 eggs. This species preys upon molluscs (including other cephalopods), crustacean and small fishes. Its maximum lifespan is 2 years. It is a species well represented on the continental shelf along its entire geographical range of distribution but it never showed high abundant concentrations. In the northern part of its geographic distribution it is caught by otter trawlers in *Sepia officinalis* fishery off the Canary Islands and Morocco waters. It is also taken by trawlers in the *S. hierredda* fishery in more southern African waters: off Senegal represents only a minor portion (1 to 2%) of the total cuttlefish catches taken by trawlers and pirogues; it is also caught off Sierra Leone, Liberia, Côte d'Ivoire and Ghana by trawlers and in small-scale fisheries. Marketed fresh or deep-frozen for export. Separate statistics are not reported for this species.



**Distribution:** Eastern Atlantic from the Canary Islands and Western Sahara to Cape Santa Maria, Angola (14°S).

***Sepia elegans*** Blainville, 1827

**Frequent synonyms / misidentifications:** *Sepia rubens* Philippi, 1844; *S. ruppellaria* Férussac and d'Orbigny, 1848; *S. biserialis* Vérany, 1851; *S. italica* Risso, 1854, *Rhombosepion ruppellarium* (Férussac and d'Orbigny): Rochebrune, 1884 / *Sepia bertheloti* d'Orbigny, 1835.

**FAO names:** **En** – Elegant cuttlefish; **Fr** – Sieche élégant; **Sp** – Choquito sin punta.

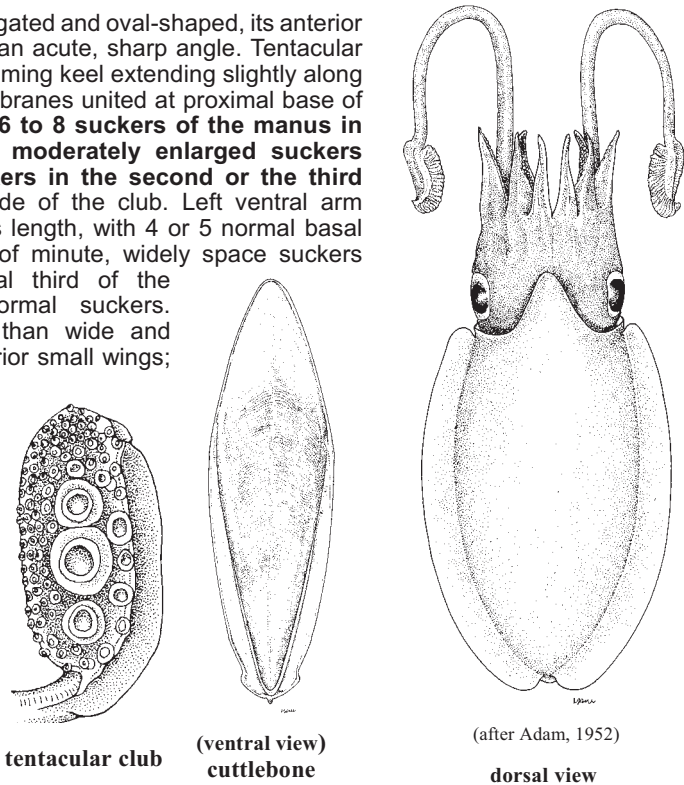
**Diagnostic characters:** Mantle elongated and oval-shaped, its anterior dorsal margin projecting strongly in an acute, sharp angle. Tentacular club short, broad, blunt distally; swimming keel extending slightly along the stalk; dorsal and protective membranes united at proximal base of club, extending slightly along stalk; **6 to 8 suckers of the manus in oblique, transverse rows; a few moderately enlarged suckers dorsally; 3 greatly enlarged suckers in the second or the third series**, counted from the dorsal side of the club. Left ventral arm hectocotylized in for two-thirds of its length, with 4 or 5 normal basal suckers followed by 9 to 11 rows of minute, widely space suckers arranged in zig-zag pattern; distal third of the hectocotylus with 4 rows of normal suckers. Cuttlebone about 2 times longer than wide and delicate; its outer cone with 2 posterior small wings; spine replaced by a small crest; dorsal surface smooth. **Colour:** reddish brown.

**Size:** Maximum dorsal mantle length in females and males are 90 and 72 mm, respectively.

**Habitat, biology, and fisheries:** A nektobenthic species. From 5 to 500 m, mainly abundant between 50 and 150 m depth. Sexual maturity may be attained at different sizes in both sexes. Males are, however, more precocious than females; males of 25 mm mantle length were observed totally mature whereas the first mature female measured 40 mm in mantle length. The spawning season extends almost throughout the year in Galicia (northwest Spain) and off West Africa, while it extends from March to October in the western Mediterranean. Spawning grounds are located in shallow waters between 15 and 70 m depth. *Sepia elegans* is known to migrate from deep to shallow waters for reproduction. Its spatial distribution and abundance changes seasonally, largely as a consequence of changes in depth distribution and resultant migration from neighbouring areas. The eggs are laid in clusters of 12 to 35 (diameter 4.2 to 4.6 mm) attached to alcyonarians (sea fans), red sea-whip, cuttlebones, etc. on muddy bottoms. Hatchlings measure about 4 mm mantle length. This species preys upon small crustaceans, bony fish and polychaeta. Females have longer tentacle clubs and ingest more food than males at any given size. Females grow faster and attain larger sizes than males. Average growth rate estimated ranges from 1.5 to 2.0 mm mantle length per month. Seasonal variations in growth rate do exist. Growth rate is faster during the initial period of its life cycle. The life span of this species is about 16 to 18 months. Its range of salinity tolerance in wild conditions varies from 33 to 35.5‰. The species is not tolerant to high salinity variations. Temperature limits of this species ranged from 10 to 18°C. It is caught as bycatch in trawl fisheries throughout its area of distribution. Separate statistics are not reported.

The spawning season extends almost throughout the year in Galicia (northwest Spain) and off West Africa, while it extends from March to October in the western Mediterranean. Spawning grounds are located in shallow waters between 15 and 70 m depth. *Sepia elegans* is known to migrate from deep to shallow waters for reproduction. Its spatial distribution and abundance changes seasonally, largely as a consequence of changes in depth distribution and resultant migration from neighbouring areas. The eggs are laid in clusters of 12 to 35 (diameter 4.2 to 4.6 mm) attached to alcyonarians (sea fans), red sea-whip, cuttlebones, etc. on muddy bottoms. Hatchlings measure about 4 mm mantle length. This species preys upon small crustaceans, bony fish and polychaeta. Females have longer tentacle clubs and ingest more food than males at any given size. Females grow faster and attain larger sizes than males. Average growth rate estimated ranges from 1.5 to 2.0 mm mantle length per month. Seasonal variations in growth rate do exist. Growth rate is faster during the initial period of its life cycle. The life span of this species is about 16 to 18 months. Its range of salinity tolerance in wild conditions varies from 33 to 35.5‰. The species is not tolerant to high salinity variations. Temperature limits of this species ranged from 10 to 18°C. It is caught as bycatch in trawl fisheries throughout its area of distribution. Separate statistics are not reported.

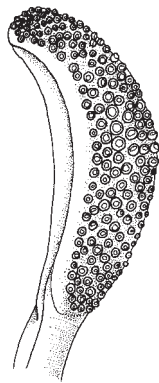
**Distribution:** The entire Mediterranean Sea and in the eastern Atlantic from 55°N to 15°S.



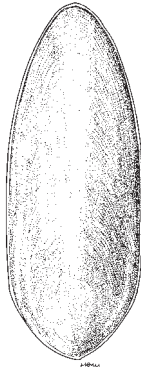
***Sepia elobyana* Adam, 1941**

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

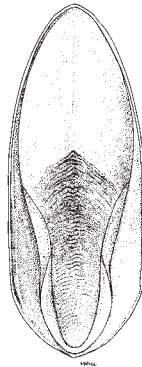
**FAO names:** En – Guinean cuttlefish; Fr – Seiche de Guinée; Sp – Sepia guineana.



tentacular club

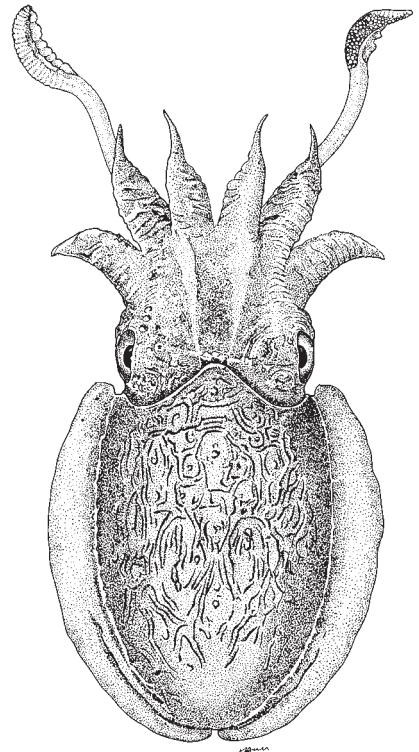


dorsal view



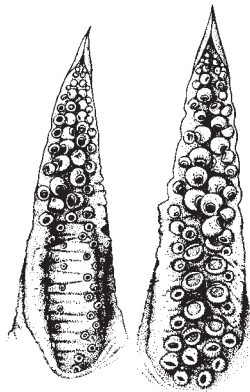
ventral view

cuttlebone



(after Adam, 1952)  
dorsal view

**Diagnostic characters:** Mantle broad, length less than 2 times width; **its dorsal surface with scattered tubercles and peculiar reticulate pattern of ridges.** Fins broad. **Tentacular club with small subequal suckers** in about 8 longitudinal rows. All arms attenuate. Suckers on arms I and II of females biserial distally and quadriserial proximally and quadriserial throughout in arms III. Suckers in males quadriserial for most of the arms, but biserial at tips. Both ventral (IV) arms in males modified. Left ventral arm with 7 or 8 rows in proximal half with minute suckers, widely spaced suckers on fleshy ridges. Spine a blunt knob.



hectocotylus

**Size:** It is a small species, maximum mantle length about 55 mm.

**Habitat, biology, and fisheries:** Unknown. None interest to fisheries. However, it is possible that this species was caught as bycatch in the trawl fisheries along the West African coast.

**Distribution:** Eastern Atlantic along West African coast from Senegal to Elobey Islands, Equatorial Guinea. Its southern limits are undetermined.

**Remarks:** The species is known from very few animals (1 male from the Gulf of Guinea, holotype, and 4 males and 1 female from Senegal). The tentacular club suckers in the holotype differ from the material caught in Senegalese waters by having some enlarged suckers and were thought by Adam (1952) to be anomalous. The differences in the relative width of the cuttlebone in the holotype and in a male specimen from Senegal strongly suggest different species. If the combined specimens constitute more than 1 species, the name must remain with the holotype, which clearly has some enlarged club suckers. This species was included in the *Sepia sensu stricto* species complex.



***Sepia hieronis* (Robson, 1924)**

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

**FAO names:** **En** – Bullet cuttlefish; **Fr** – Seiche arrondie; **Sp** – Sepia redondeada.

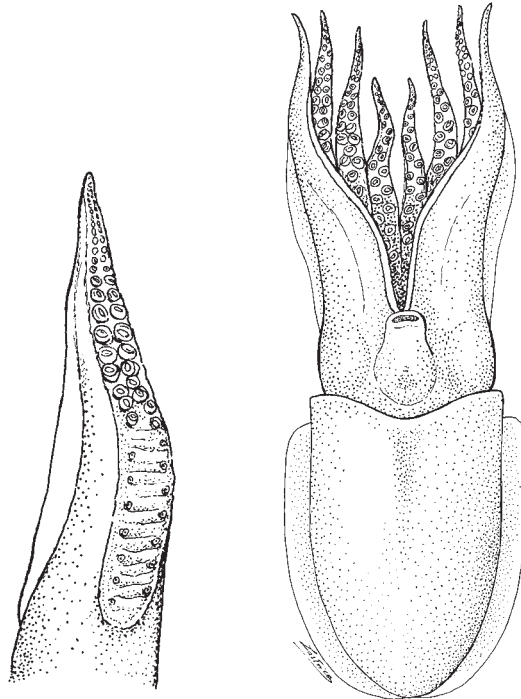
**Diagnostic characters:** Arm suckers biserial or quadriserial but variable. Lateral arms with several medial suckers enlarged, especially in males. **Arms of females attenuated distally.** Left ventral arm of males hectocotylized over proximal half, with transversely wrinkled area separating 7 pairs of dorsal suckers and 14 ventral suckers in a single series. Tentacular clubs with subequal suckers in 5 to 8 longitudinal series. **Cuttlebone form rhomboid, frequently pink dorsally, with blunt posterior knob, spine absent.** Anterior striae with 3 rounded peaks.

**Size:** Maximum mantle length 70 mm.

**Habitat, biology, and fisheries:** Biology virtually unknown. Inhabits waters from 30 to 460 m depth. Maximum biomass off the South African west coast was 1 074 tonnes in August 1988. Biomass greatest in 130 to 220 m depth, at temperatures of 8.5 to 10°C.

**Distribution:** Off Kunene River, Namibia, to Kenya.

**Remarks:** Second most abundant sepiid off southern African west coast. Specimens from Mozambique show some morphological differences.



hectocotylus

ventral view





***Sepia hierredda* Rang, 1835**

**Frequent synonyms / misidentifications:** *Acanthosepion oculifera* Rochebrune, 1884, *A. goreense* Rochebrune, 1884 / *Sepia officinalis* Linnaeus, 1758.

**FAO names:** **En** – Giant African cuttlefish; **Fr** – Seiche géante africaine; **Sp** – *Sepia gigante africana*.

**Diagnostic characters:** Anterior dorsal margin of the mantle projecting in an obtuse, blunt angle. **Tentacular club** long with 5 or 6 suckers in transverse rows; **suckers differ in size: 5 or 6 median suckers of proximal rows twice diameter of rest.** **Left ventral arm (IV) hectocotylized, with 8 to 14 transverse rows of reduced suckers distally.** **Cuttlebone anteriorly very acuminate;** its striated zone extends over 47% of its length; cuttlebone width is 35% of mantle length and its thickness 12% of mantle length; its spine is never covered by chitin. **Colour:** pattern very similar to *Sepia officinalis*.

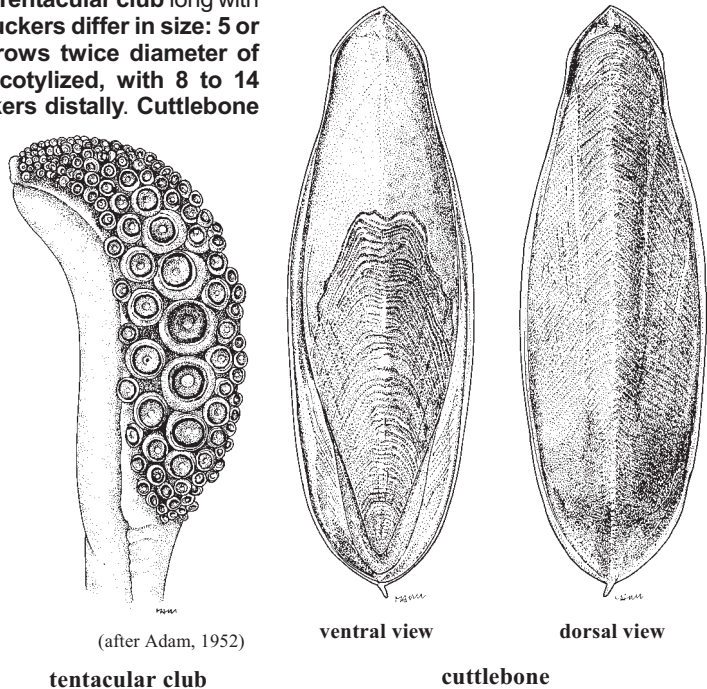
**Size:** Maximum dorsal mantle length (mantle length) 500 mm.

**Habitat, biology, and fisheries:**

A nektonic, neritic species. From coastal waters (7 m) to the slope of the continental shelf (about 200 m). Females mature at 13 cm mantle length. Spawning take place from January to September in shallow waters. Total individual fecundity ranges from 250 eggs at 13 cm mantle length to 1 400 eggs at 35 cm mantle length. Spawning migrations towards the coast have been observed. Growth rates of 26 mm per month up to a length of 10 cm, slowing down to 21 mm per month between 10 and 35 cm mantle length were observed. Life span around 2 years. It is a species of commercial importance. Catches of unidentified cuttlefishes are taken in West Africa. However, the main fraction of the total catches in that area can be attributed to *Sepia hierredda*, which is mainly fished by Moroccan in the south, Mauritanian and Senegalese boats, as well as by trawlers from China and Korea. Along the coast of Senegal, the cuttlefish is mainly caught at depths of 7 to 16 m by canoes using jigs and traps and from 10 to 150 m depth by trawlers. The species is usually marketed fresh and frozen.

**Distribution:** Western Africa, from Cape Blanc, Mauritania, 21°N to Baía dos Tigres, Angola, 16°30'S.

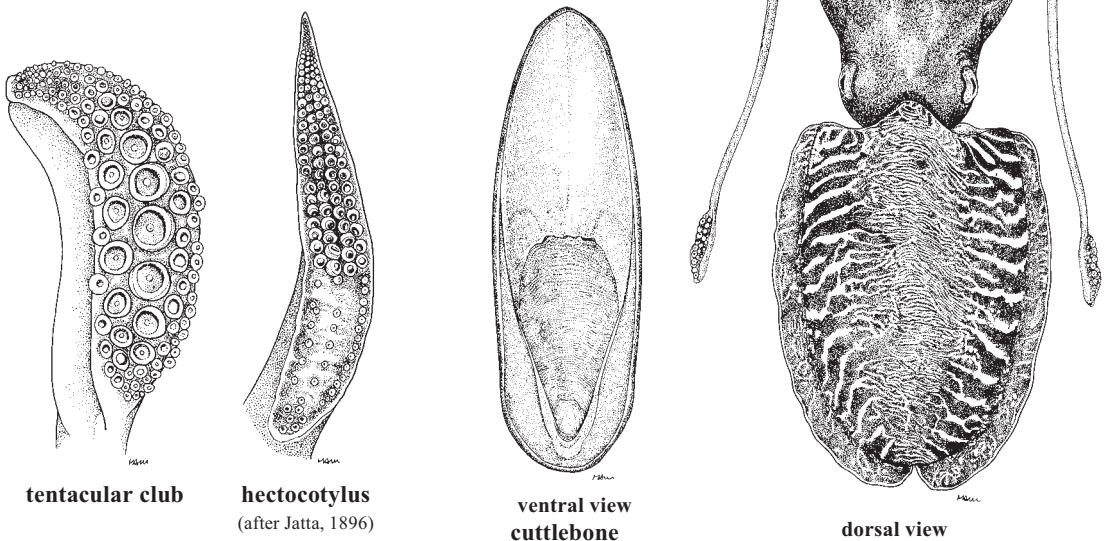
**Remarks:** This species has been long considered as a subspecies of *Sepia officinalis*. Based on morphological and genetic analysis it has been shown that *S. officinalis* and *S. hierredda* are clearly different species of the same genus.



***Sepia officinalis* Linnaeus, 1758**

**Frequent synonyms / misidentifications:** *Sepia filliouxii* Lafont, 1869; *S. fischeri* Lafont, 1871; *S. mediterranea* Ninni, 1885 / *Sepia hierredda* Rang, 1835.

**FAO names:** **En** – Common cuttlefish; **Fr** – Seiche commune; **Sp** – Sepia común.



**Diagnostic characters:** Tentacular club with 5 or 6 suckers in each transverse row, the medial one twice diameter of rest; swimming keel not extending proximally beyond the base of club. Left arm IV hectocotylized by reduction of the size of suckers in proximal 4 to 8 horizontal rows; dorsal protective membrane of normal width; cuttlebone anteriorly and posteriorly rounded with parallel sides a weak spine visible in juveniles, but embedded in chitin in adults.

**Size:** Maximum mantle length (ML) 40 cm, though possibly a record of 45 cm exists for this species. Common sizes in the English Channel range from 10 to 22 cm mantle length and between 15 and 25 cm mantle length in the northwestern coasts of Africa.

**Habitat, biology, and fisheries:** A nektonic, neritic species occurring predominantly on sandy and muddy bottoms mainly covered by algae and marine grasses (*Zostera* and *Posidonia*). From the coastal line to about 200 m depth, but most abundant in the upper 100 m. Generally lays its eggs in shallow waters, at depths rarely greater 30 to 40 m. Eggs, normally black, are attached in grape-like clusters to different substrata fixed on the bottom. The greatest length of the eggs ranged from 2.5 to 3.0 mm. The hatchling has a mantle length ranging from 6 to 9 mm. The highest growth rates of about 0.6 to 0.9 mm increase in mantle length per day were observed at temperatures about 20°C. The lowest growth rate of about 0.2 to 0.3 mm per day was at temperatures between 10° and 13°C. This species has a short lifespan (up to 2 years). Food mainly consists of small crabs, shrimps, demersal fishes, cephalopods and polychaeta. Common cuttlefish attain sexual maturity at very different sizes. Length at first maturity is about 13 cm mantle length in females, and between 12 and 14 cm in males in northwestern African waters. Males may carry up to 1 400 spermatophores, females between 150 to 4 000 eggs, depending on their size. Predators of common cuttlefish included cephalopods, sharks, sparids and other large demersal fish, marine mammals and birds at different stages of its life history. However, the impact of predation in populations is unknown. Although various parasites are known in juvenile and adult *Sepia officinalis*, most of them (except the coccidian *Aggregata eberthi*) do not appear to be very important as mortality factors at prereproductive stages. The species is known to be relatively tolerant to salinity variations. Its range of salinity in wild conditions varies from

25 to 40‰, but it can survive for some time at salinities around 18‰ if slowly acclimatized, although normal embryonic development requires salinities above 25‰. Temperature limits of this species ranged from 10 to 30°C. *S. officinalis* is an important species for the commercial fisheries of many countries. In large-scale fisheries is primarily caught by otter and beam trawlers, either as a target species or as bycatch to demersal finfish. In small-scale fisheries it is caught by gillnets and trammel nets as well as a great variety of highly selective gears, such as spears, pots, traps, lures, jigs and luring the males with a live female attached to a thin line. The species has been successfully reared in aquaculture experiments of medium scale.

**Distribution:** The species is distributed from the eastern Atlantic to the southwest Baltic Sea (only occasional incursions) and from the North Sea to the northwestern coast of Africa. *Sepia officinalis* and *S. hierredda* are sympatric species. The southern geographic limit of *S. officinalis* coincides approximately with the border between Mauritania and Senegal (approximately 16°N) and the northern limit of *S. hierredda* is at the latitude of Cape Blanc (21°N).

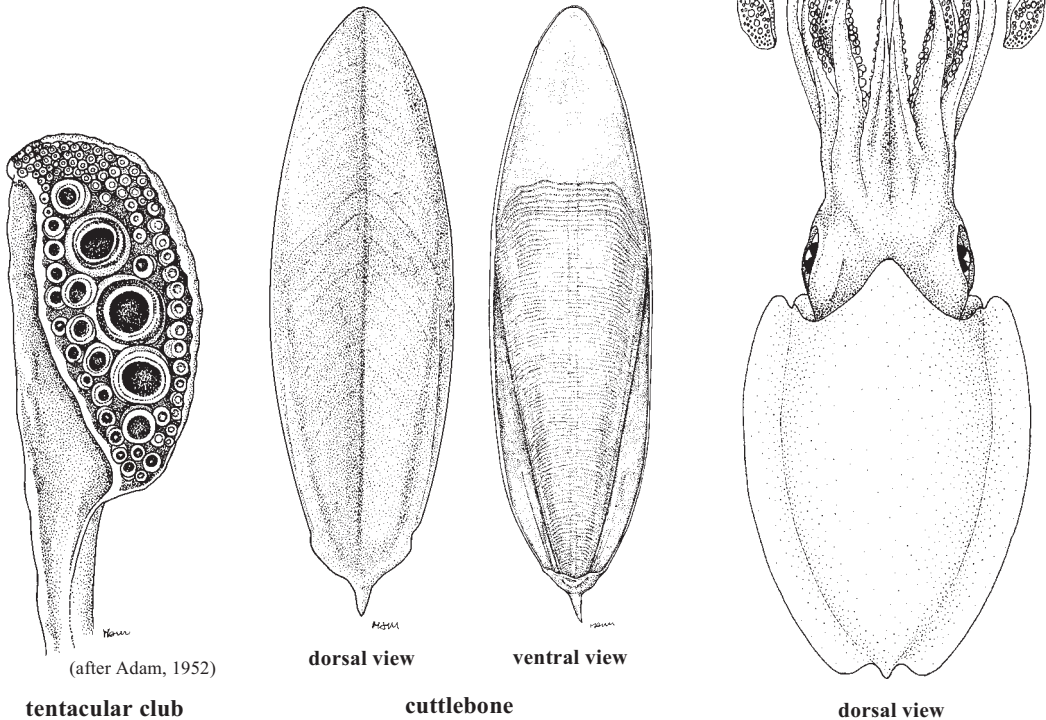


**Remarks:** Off the northwest African coasts, the distribution ranges of *S. officinalis* and *S. hierredda* Rang 1837 overlap. Recent data and information seem to agree on the southern limit of *S. officinalis* (16°-17°N) and the northern limit of *S. hierredda* (Cape Blanc, 21°N), thus framing the area of overlap (between 16° and 21° N; e.g., Guerra *et al.*, 2001; Reid *et al.*, 2005). However, broader areas of overlap were reported in earlier times (see Ikeda, 1972 and Delgado de Molina Acevedo *et al.*, 1993 for additional details). This resulted in confusion about the maximum size for the species, since disagreement occurred about the identity of the (then) sub-species examined. According to recently given range distribution limits, the maximum size ever recorded for *S. officinalis* would be 45 cm ML (Delgado de Molina Acevedo *et al.*, 1993; African waters between 21° and 26°N, off Sahara). From Guerra *et al.* (In press).

*Sepia orbignyana* Férussac in d'Orbigny, 1826

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

**FAO names:** En – Pink cuttlefish; Fr – Sieche rosée;  
Sp – Sepia con punta.



**Diagnostic characters:** Mantle oval-shaped, its anterior dorsal margin projecting in an acute, sharp angle. Four transverse rows of suckers on the arms. Tentacular club short, broad, blunt distally; swimming keel extends proximally beyond base of club; **5 or 6 suckers of the manus in oblique, transverse rows; the medial longitudinal row with 3 greatly and 2 moderate enlarged suckers.** Left ventral arm hectocotylized in two-thirds to three-fourths of its length, with 3 normal basal suckers followed by rows of minute, widely space suckers arranged in zig-zag pattern; **distal third of the hectocotylus with a dozen of transverse rows of 4 minute and normal suckers to tip of the arm.** Cuttlebone relatively robust; its width is one-third of its length; **posterior spine very pronounced and projecting out of the posterior part of the mantle; dorsal surface rose or orange coloured to one-third of its length with a faint medial groove.** **Colour:** reddish brown mottled.

**Size:** Maximum dorsal mantle length (ML) 120 mm.

**Habitat, biology, and fisheries:** A nektobenthic species occurring over muddy and detritus-rich continental shelf and slope areas. From 30 to 512 m, it is mainly abundant from 80 to 200 m depths. Sexual maturity may be attained at different sizes in both sexes. Males are, however, more precocious than females. In the western Mediterranean length at first maturity is 50 mm in males and 78 mm in females, whereas in West Africa populations males reach sexual maturity at about 40 to 50 mm mantle length and females at 70 mm mantle length. The spawning season extends almost throughout the year with a period of higher intensity from early summer to autumn. Spawning occurs at temperatures from 13° to 16°C. No inshore spawning migrations

have been reported. Its spatial distribution and abundance changes seasonally, largely as a consequence of changes in depth distribution. The eggs are laid in clusters of 30 to 40 (diameter 7 to 9 mm) attached to sponges on muddy bottoms. Hatchlings measure 6 to 7 mm mantle length; specimens of 36 to 40 mm mantle length are 9 month old at 10° to 20°C. Females have longer tentacle clubs and ingest more food than females at any given size. Its diet is mostly composed by crustaceans (Alpheidae, Processidae, Cangronidae and Portunidae) and bony fish (Gobiidae). Females grow faster than males. The life span of this species is about 16 to 18 months. This species is caught as bycatch in trawl fisheries throughout its area of distribution. Separate statistics are not reported for this species, which is sold together with other sepiids and sepiolids species, mainly together with small *Sepia officinalis* and *S. hierredda*. It is marketed fresh and frozen.

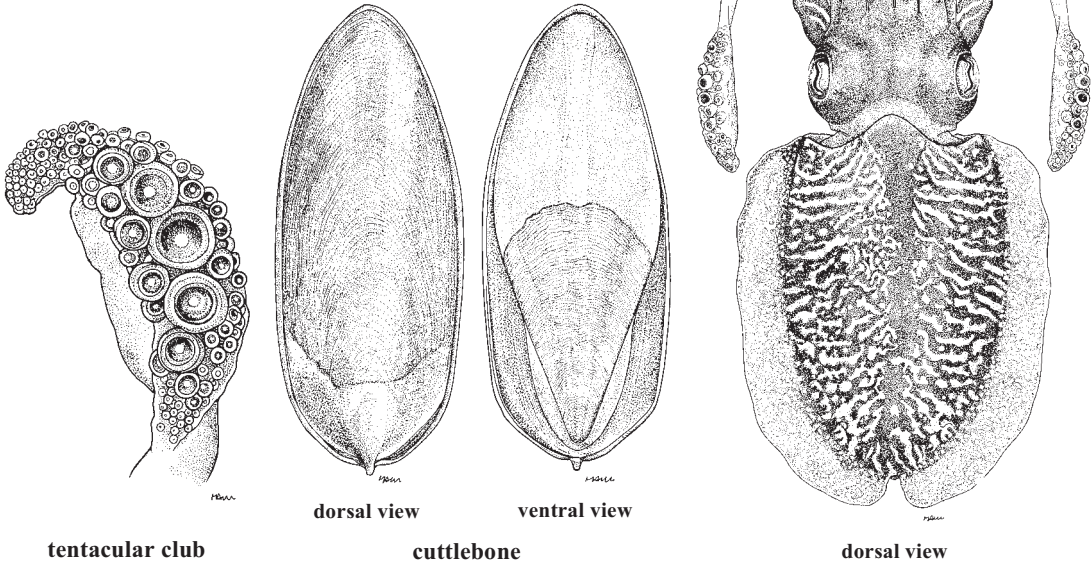
**Distribution:** The entire Mediterranean Sea and in the eastern Atlantic from 55°N to 17°S.



***Sepia vermiculata* Quoy and Gaimard, 1832**

**Frequent synonyms / misidentifications:** *Sepia officinalis vermiculata* Quoy and Gaimard, 1832 / *Sepia officinalis* Linnaeus, 1758.

**FAO names:** **En** – Patchwork cuttlefish; **Fr** – Seiche reticulée; **Sp** – *Sepia reticulada*.



tentacular club

dorsal view

ventral view

dorsal view

**Diagnostic characters:** Arms with quadriserial suckers. Left arm IV hectocotylized in males. About 6 normal suckers at base of arm, followed by 8–9 to 12–13 rows of modified suckers. **Tentacular club** bearing small distal suckers in oblique rows of 8; **median suckers of proximal part moderately enlarged, 2.0 to 2.5 times as large as marginals**; tentacular club length 24 to 38% mantle length. Cuttlebone broadly oval, dorsal surface tuberculate; striated zone with median longitudinal ridge, its length 41 to 75%, mean 50% cuttlebone length, anterior striae rounded-M-shaped; **cuttlebone width 33 to 42% cuttlebone length**; thickness 9 to 15% cuttlebone length; **spine present, surrounded by chitinous covering**. Mottled, banded, striped patterns, primarily dark (blacks, browns) on light background (yellow, beige); distinct transverse zebra stripes dorsally and small white spots on the fins in mature animals.

**Size:** Up to 287 mm mantle length.

**Habitat, biology, and fisheries:** A nektonic species of the littoral, shallow bays and continental shelf, in depths of 0 to 290 m, most abundant at depths less than 100 m, on sandy to muddy bottoms; the only *Sepia* species in southern Africa that enters lagoons and river mouths, for at least part of the year. Biology little known; feeds on molluscs, crabs, shrimps, other cuttlefishes and juvenile fishes; preyed upon by sharks, sparids and other demersal fishes; cannibalism is common. Mature from 150 mm mantle length, spawns in shallow waters. Life span is about 2 years. Caught with seine nets and bottom trawls; not exploited at present, but has potential, for both fisheries and aquaculture. No information is available at present, but this species is believed to have potential to fisheries due to its size and distribution.

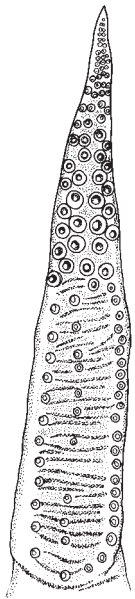
**Distribution:** Namibia to Mozambique and Saya-de-Malha Bank.



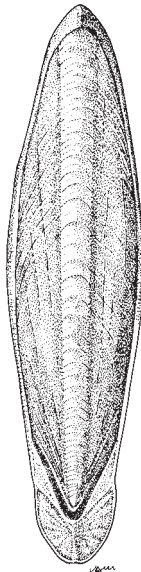
***Sepiella ornata* (Rang, 1837)**

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

**FAO names:** **En** – Ornate cuttlefish; **Fr** – Seiche ornée; **Sp** – Sepia orlada.



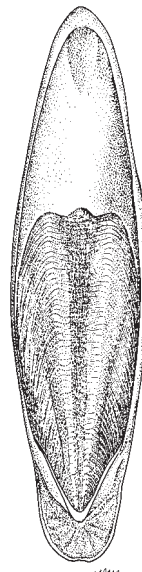
hectocotylus



dorsal view



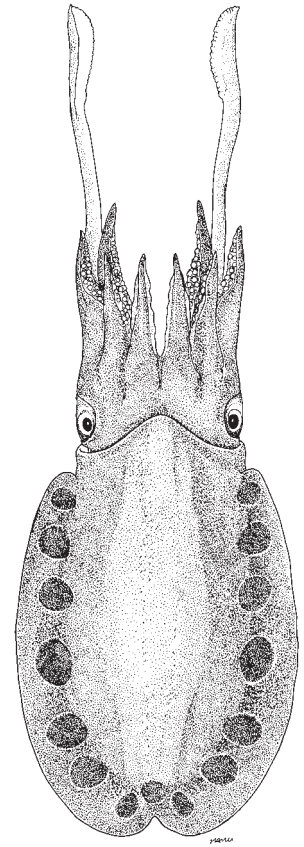
lateral view



ventral view

(after Adam, 1939)

cuttlebone



dorsal view

**Diagnostic characters:** Mantle elongate, ovoid; a large subcutaneous gland present that opens by a  **pore between posterior ends of fins**. Arm suckers quadriserial and subequal in size. Left arm IV of male hectocotylized on proximal half with fleshy transverse ridges and about 40 minute suckers in 4 series, the 2 dorsal series widely separated, the 2 ventral series close-set in a zig-zag pattern. **Tentacular clubs narrow, with 10 to 14 series of minute, subequal suckers** (10 to 12 series in males, 12 to 14 in females). **Cuttlebone elongate with broad, wing-like outer cone**, longer in male than female, and angle of inner cone is smaller in the male; **its width 24 to 30% of length** (24 to 27 in males, 27 to 30 in females). **Spine absent. Adults have a series of 7 reddish large patches along dorsal-fin bases.**

**Size:** Maximum mantle length 100 mm.

**Habitat, biology, and fisheries:** A demersal species on muddy or sandy mud bottoms, 13 to 16 km from shore, depth range 0 to 150 m, usually deeper than 30 m. It is taken mostly as bycatch in bottom trawls mixed with *Sepia* species, the highest yields coming from waters deeper than 50 m.

**Distribution:** Eastern Atlantic from Mauritania (Cape Blanco) to Cape Frio, Namibia.

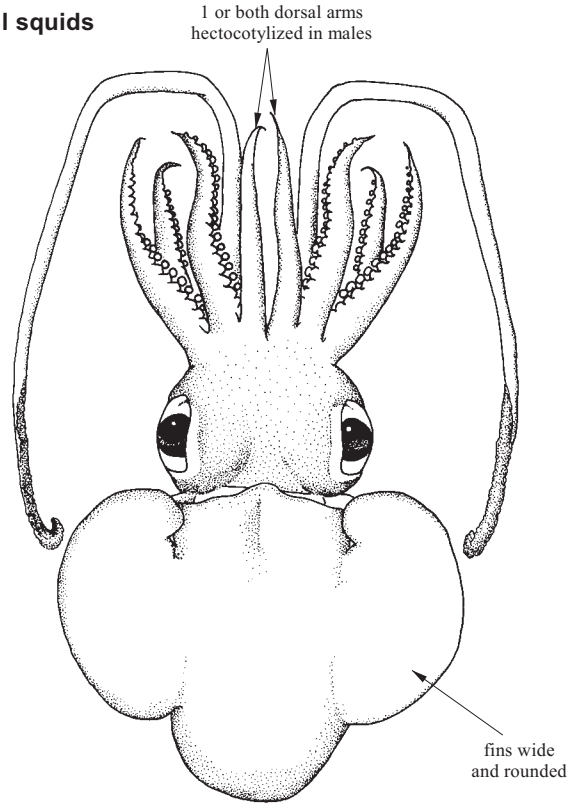


**SEPIOLIDAE**

**Bobtail squids**

**Diagnostic characters:** Small and broad cephalopods with a rounded posterior mantle. Dorsal mantle margin fused to head in some species, ventral mantle margin extends beneath the head in others. Fins broadly separated posteriorly, ear-like, with free anterior and posterior lobes. Large eyes with cornea and ventral eyelid. Lateral funnel adductor present between head and funnel at funnel locking apparatus, which is simple and linear. Median mantle cavity divided by septum. Strong adductor muscles present. Protective membranes of arms generally absent. One or both dorsal arms (I) hectocotylized; 1 arm of pair II (dorsolateral) may also be modified. Tentacles retractable with well defined club. Pen chitinous, rudimentary or absent. Frequently with light organs on ink sac; light organs fused into a single large organ in some species.

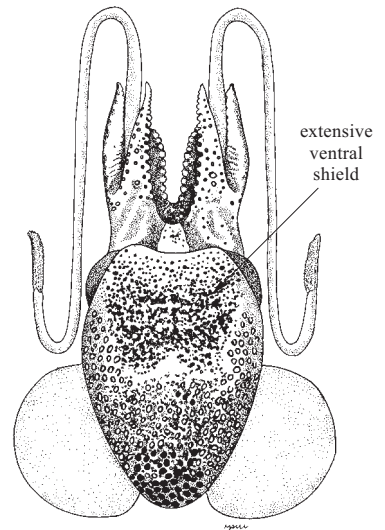
**Habitat and biology:** Benthic or neritic. There are some mesopelagic species living in midwater over or near the continental slope.



dorsal view

**Key to the species of Sepiolidae occurring in the area**

- 1a. All arms except ventral pair (IV) united by a broad web; anterior edge of ventral mantle extended into extensive ventral shield anteriorly, covering the funnel and sometimes reaching the eye level (Fig. 1) . . . . . **Subfamily Heteroteuthinae → 3**
- 1b. Arms not united by a broad web, or only ventrolateral pair (III) or ventral pair united by a broad web; anterior edge of the ventral mantle not forming a ventral shield . . . . . → 2



**Fig. 1 Heteroteuthinae (*Heteroteuthis*)**



- 2a. Dorsal mantle fused to head by cutaneous occipital band (Fig. 2) . . . **Subfamily Sepiolinae** → 4
- 2b. Dorsal mantle not fused to head by cutaneous occipital band (Fig. 3) . . . **Subfamily Rossiinae** → 6

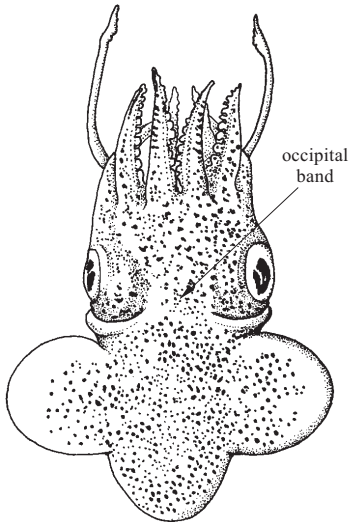


Fig. 2 Sepiolinae

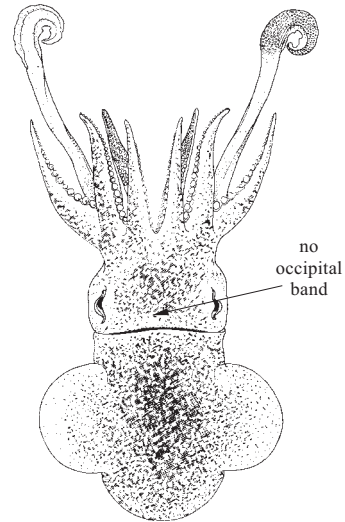


Fig. 3 Rossiinae

- 3a. Occipital band joining mantle to head from 40 to 50% head width; ventral shield extending only to level of eyes . . . . . ***Stoloteuthis leucoptera***
- 3b. Occipital band almost equal to head width; ventral shield exceeds level of anterior margin of eye, reaching proximal end of arms . . . . . ***Heteroteuthis dispar***
  
- 4a. Light organs present on the ink sac . . . . . → 5
- 4b. Without light organs present on the ink sac . . . . . ***Sepietta oweniana***
  
- 5a. A pair of kidney-shaped light organs on anterior surface of ink sac (Fig. 4a) . . . . . ***Sepiolo***
- 5b. Unpaired round light organ deeply embedded in tissue on ventral side of ink sac (Fig. 4b) . . . . . ***Rondeletiola minor***
  
- 6a. Anal flaps present, well developed (Fig. 5a); ink sac well developed . . . . . → 7
- 6b. Anal flaps reduced or absent (Fig. 5b); ink sac greatly reduced . . . . . ***Neorossia caroli***

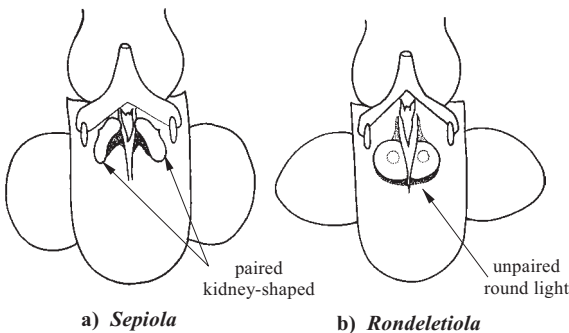


Fig. 4 mantle cavity

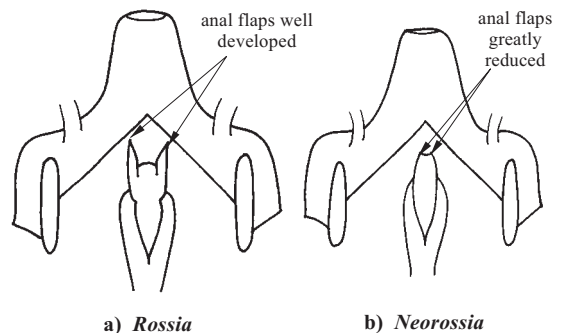


Fig. 5 mantle cavity

- 7a. Tentacle club expanded with 5 to 16 transverse rows of medium-sized suckers . . . ***Rossia macrosoma***  
 7b. Tentacle club not expanded with 24 to 40 transverse rows of minute suckers  
 . . . . . ***Austrorossia mastigophora***

### List of species occurring in the area

The symbol 🦑 is given when species accounts are included.

- 🦑 *Austrorossia mastigophora* (Chun, 1915).
- 🦑 *Heteroteuthis dispar* (Rüppell, 1845).
- 🦑 *Neorossia caroli* (Joubin, 1902).
- 🦑 *Rondeletiola minor* (Naef, 1912).
- 🦑 *Rossia macrosoma* (Delle Chiaje, 1830).
- 🦑 *Sepietta oweniana* (Orbigny, 1840).
- 🦑 *Sepiolo atlantica* d'Orbigny, 1839–1842.
- 🦑 *Sepiolo aurantiaca* Jatta, 1896.
- 🦑 *Sepiolo knudseni* Adam, 1984.
- 🦑 *Sepiolo rondeletii* Leach, 1817.
- 🦑 *Stoloteuthis leucoptera* (Verrill, 1878).

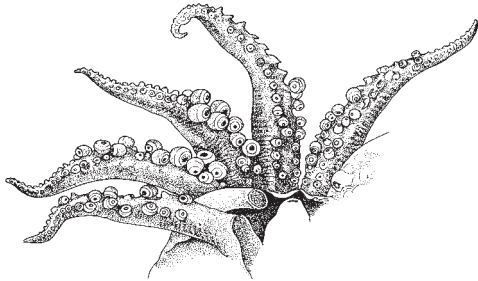
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***Austrorossia mastigophora* (Chun, 1915)**

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

**FAO names:** **En** – Whip-bearing bobtail; **Fr** – Sépiole fouet; **Sp** – Globito látigo.



**arms of male**

(after Chun, 1915)

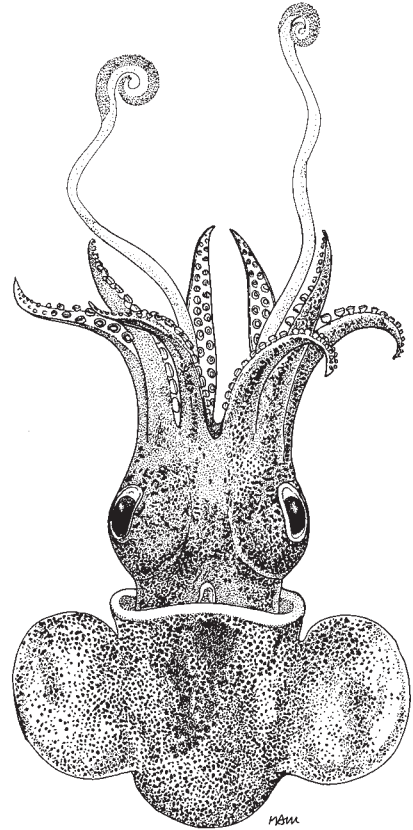
**Diagnostic characters:** Mantle sac-shaped and rounded posteriorly without tubercles or papillae. **Margin slightly retracted, especially on the dorsal side without projecting corners.** Fins occupying two-thirds of the length of the mantle. Arms suckers biserial; **in males, 8 pairs of enlarged suckers on ventral (IV) and ventrolateral (III), and 6 on dorsolateral arms (II).** A shallow, grey groove is present in the inner side of the stalk of the tentacle. **Club dorsally curved like a horn** with very small suckers (30 to 40 in each row).

**Size:** Males to approximate 31 mm and females up to 46 mm mantle length.

**Habitat, biology, and fisheries:** This species extends up to 640 m depth. Its biology is poorly known due to the few records available. No current interest to fisheries.

**Distribution:** Western, southern and eastern Africa from Guinea and Somalia to the Cape of Good Hope.

**Remarks:** This species is closely allied and probably identical to *Austrorossia enigmatica* (Robson, 1924).



**dorsal view**

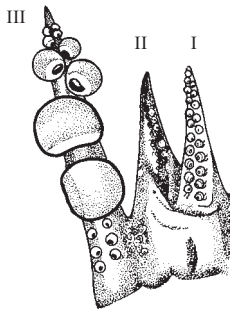
(after Chun, 1915)



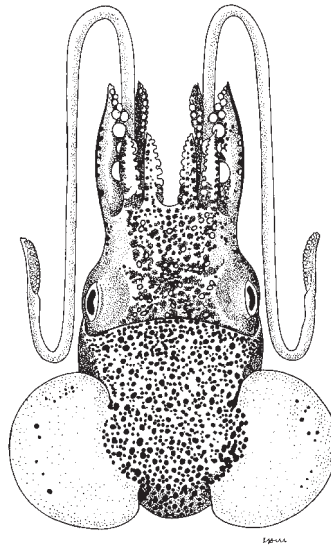
***Heteroteuthis dispar* (Rüppell, 1844)**

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

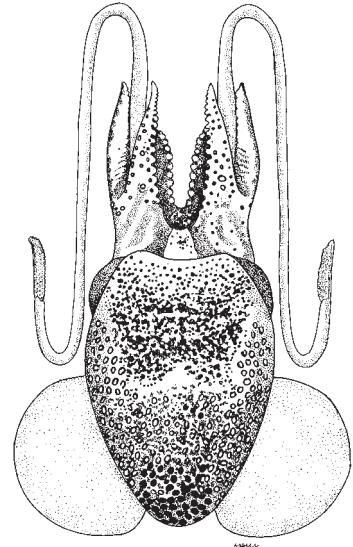
**FAO names:** En – Odd bobtail;  
Fr – Sépiole différente; Sp – Globito aberrante.



arms of male



dorsal view



ventral view

**Diagnostic characters:** Dorsal mantle not fused to head. Ventral mantle strongly produced anteriorly, nearly covers funnel. Fins long; positioned posterior to the dorsal midpoint. Anterior edge of fin at middle of ventral mantle length. **Mature males:** arms I-II much shorter than III-IV; arms III with 2 enormous suckers and 3 more enlarged suckers. Right arms I-II connected by deep web up to half their length. **Mature females:** tips of arms I-II without suckers, tip of arm II slightly thickened, with oral keel. Tentacles very long with more than 8 transverse rows of club suckers. Rounded light organ present inside the mantle cavity on the ink sac.

**Size:** Up to 25 mm mantle length.

**Habitat, biology, and fisheries:** Tropical and subtropical Atlantic. In depths of 110 to 1 680 m. Spawns on the bottom at the slope; larvae meso- and bathypelagic, adults in lower epibenthic and mesopelagic zones but also collected on the bottom. Known predators are black scabbardfish, longnose lancetfish, swordfish, tunas, sharks and dolphins. No interest to fisheries.

**Distribution:** Madeira and Canaries to Cape Verd and off Guinea Bissau; Ireland to Azores, Mediterranean and western Atlantic, as well as Gibraltar.

**Remarks:** After Nesis (1982/87), *Heteroteuthis atlantis* Voss, 1955 is a synonymous of *H. dispar*. However, the differences between both species are clear and do not seem to justify the decision of Nesis. Therefore, until the taxonomy the genus is studied in detail, the validity of *H. atlantis* remains questionable.

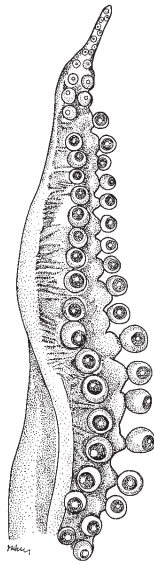


*Neorossia caroli* (Joubin, 1902)

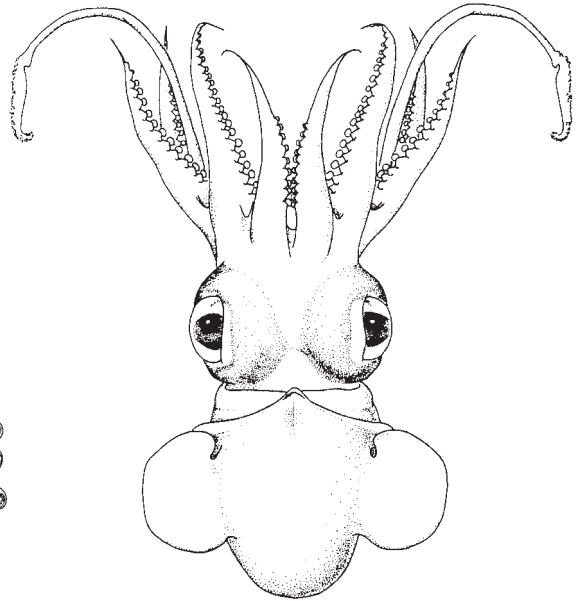
**Frequent synonyms / misidentifications:** None / None.

**FAO names:** **En** – Carol bobtail squid; **Fr** – Sépiole de Carol; **Sp** – Globito de Carol.

**Diagnostic characters:** Dorsal mantle border not fused to head. **Ink sac and anal flaps on the anus greatly reduced and non-functional.** Mantle short and very broad. Median anterodorsal edge of mantle with low V-shaped projection. Anteroventral edge of mantle with shallow crescentic emargination. Dorsal edge of mantle margin projects beyond ventral mantle edge. **Nuchal cartilage oval.** Fins large and moderately broad rounded. Head broader than long. Eyes very large and bulbous. Arms short, robust and broad at bases with 2 rows of spherical suckers. Dorsal pair of arms of males hectocotylized, proximal ventral edge of these arms bordered by a furrow and crest on oral surface extending from sucker rows 3 to 18, minute suckers at tips. Tentacles relatively long and slender with naked stalks, their length ranging from approximately 1 to 4 times the mantle length. Club suckers in 8 to 11 oblique rows.



hectocotylus



dorsal view

**Size:** Males up to 51 mm and females up to 83 mm mantle length.

**Habitat, biology, and fisheries:** A bathybenthic species inhabiting waters between 200 and 1 744 m, most abundant between 400 and 700 m in muddy bottoms. Mature individuals present throughout the year suggesting an extend spawning season. The smallest male with spermatophores was 30 mm mantle length. The smaller mature female was 50 mm mantle length. Large round, translucent eggs with a mean diameter 9.9 mm. Spermatophores between 36.5 and 41.2% mantle length. Large mature animals have a thick gelatinous consistency. The life span is probably between 12 and 24 months. A species of minor commercial importance, taken only as bycatch in trawls. Separate statistics are not reported for this species.

**Distribution:** Eastern Atlantic and Mediterranean Sea: from southwestern Iceland and Ireland southward to the Gulf of Guinea and Namibian coast of southern Africa.

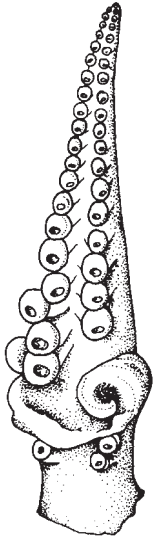
**Remarks:** Two subspecies has been described: *Neorossia caroli caroli* (Joubin, 1902) and *Neorossia caroli jeannae* (Nesis *et al.*, 2001) described from specimens collected on the Patagonian slope, north of Falkland Islands. The main difference between both subspecies is the size and shape of fins and the nuchal cartilage. However, further studies are necessary to determine the status of these subspecies.



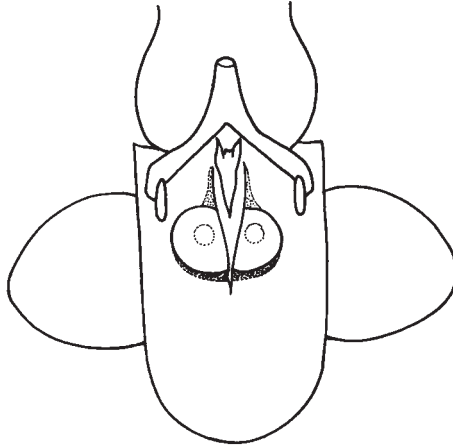
***Rondeletiola minor*** (Naef, 1912)

**Frequent synonyms / misidentifications:** *Sepietta minor* Naef, 1912 / None.

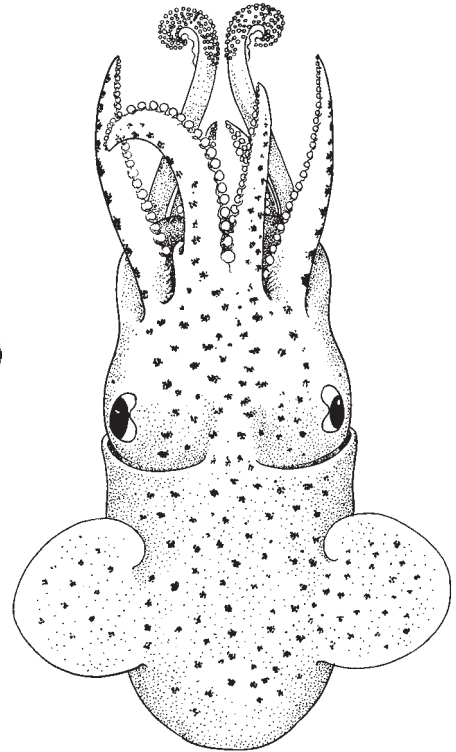
**FAO names:** En – Lentil bobtail squid; Fr – Sépiole bobie; Sp – Globito pequeño.



hectocotylus



mantle cavity of mature female



dorsal view

**Diagnostic characters:** Mantle blunt, bullet-shaped. Fins small, round, with blunt lateral angles. Tentacular clubs with about 16 small uniform suckers in each transverse row. **Unpaired round light organ** (as result from the lateral fusion of 2 lentil-shaped light organs) **present on ink sac**. Ventral arms with normal biserial suckers to apex; left arm I hectocotylized, with 3 small suckers at base of a **copulatory apparatus, which is large, swollen, transverse, hood-shaped horn with small accessory papilla**; suckers distal to the papilla greatly enlarged in the dorsal row to the tip of the arm, in the ventral row only about the proximal half of the suckers are enlarged; the 2 rows not widely separated.

**Size:** Maximum mantle length (ML) 25 mm.

**Habitat, biology, and fisheries:** A nectobenthic species inhabiting sand and mud bottoms. Between 35 and 600 m. It performs vertical diurnal migrations. Both sexes mature from 12 to 15 mm mantle length. Juveniles found near inshore waters, and adults in deep waters. This species is not of interest to fisheries.

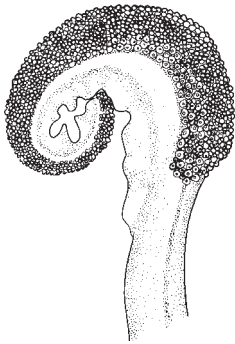
**Distribution:** Mediterranean Sea and eastern Atlantic from Northwest Iberian Peninsula to South Africa.



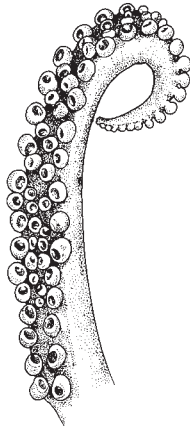
***Rossia macrosoma* (Delle Chiaie, 1830)**

**Frequent synonyms / misidentifications:** *Sepiola macrosoma* Delle Chiaie, 1829 / None.

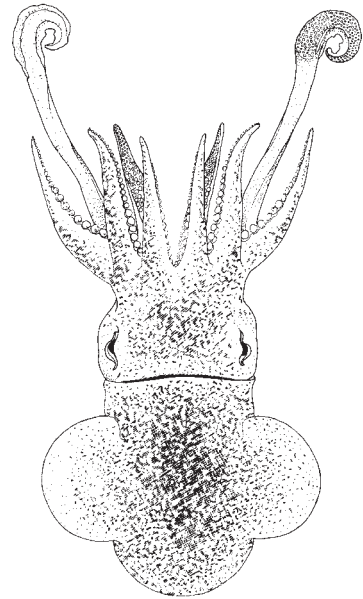
**FAO names:** En – Stout bobtail squid; Fr – Sépiole melon; Sp – Globito robusto.



tentacular club



arm



dorsal view

**Diagnostic characters:** Dorsal mantle border not fused to head. Well developed, functional ink sac with regular anal flaps. Nuchal cartilage oval, broad. Arms with 4 rows of suckers medially and distally. Tentacular club with 8 to 12 subequal suckers all much smaller than arm suckers and arranged in transverse rows. Swimming keel equal to club length. Arms III and IV united by a broad web. Both dorsal arms hectocotylized by decrease in size of the 2 rows of large basal suckers to smaller suckers, which are arranged in 4 rows in a rounded zigzag pattern; a deep ridge and groove is present between each transverse rows of suckers. **Colour:** Light yellowish brown with greenish reflection to dark reddish brown.

**Size:** Maximum mantle length (ML) 85 mm.

**Habitat, biology, and fisheries:** *Nectobenthic* species inhabiting sandy and detritic but mainly muddy bottoms between 30 and 900 m depth. It undertakes seasonal migrations between deeper offshore waters in winter and shallower coastal areas during the rest of the year, but partitioned by size in such a wide than larges individuals arrive first in spring, followed by smaller individuals in summer. The spawning season of this species extent from spring to autumn. Eggs are deposited in clusters of 30 to 40 (egg diameter 6 to 8 mm) on shells or other bottom substrata. Egg's cover is hard and bluish violet in colour. Mature males (40 mm mantle length, aged 7 or 8 months) carry 85 to 100 spermatophores. Females (57 mm mantle length upward, aged 8 to 11 months) have about 120 to 150 oocytes in the ovary. Embryonic development last 45 days at 16°C. Females grow larger than males. Life span ranging from 12 to 16 months. Its preys are constituted by small bottom organisms. It is predated by several species of small sharks and rays. A species of minor commercial importance, taken as bycatch in bottom trawls, mostly between 100 and 250 m depth. The flesh is tasty but difficult to preserve. Separate statistics are not reported for this species.

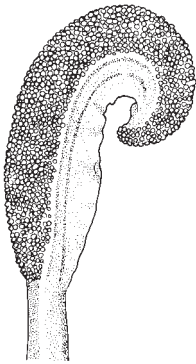
**Distribution:** Mediterranean Sea, from the 70°N to the Gulf of Guinea in the eastern Atlantic.



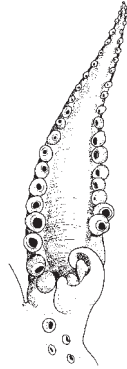
*Sepietta oweniana* (d'Orbigny, 1840)

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

**FAO names:** En – Common bobtail squid; Fr – Sépiole commune; Sp – Sepieta común.

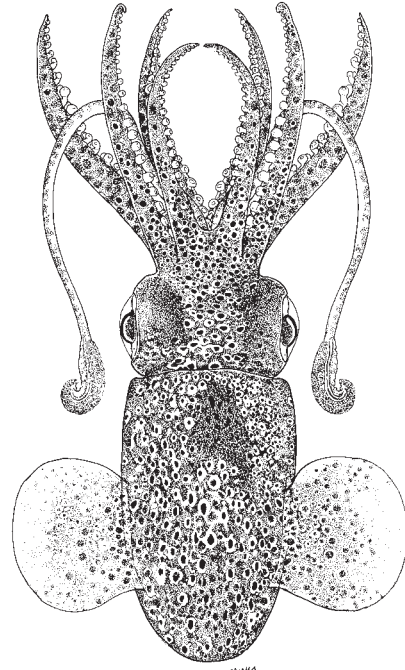


tentacular club



hectocotylus

(after Naef, 1921–23)



dorsal view

**Diagnostic characters:** Mantle blunt, bullet-shaped. No web or shallow web joint arms. Fins short, not exceeding the mantle with a slight lateral angle and pronounced anterior lobes or “earlets”. Dorsal edge of the mantle fused to the head. **No light organs (photophores) inside mantle cavity.** Dorsolateral arms (II) with 6 enlarged suckers in the ventral row being the opposite ones lower in size. **Tentacular club with 26 to 32 minute subequal suckers in transverse rows.** Left arm I in males hectocotylized by 4 small normal sucker at base followed by a **flesh transverse swelling with a long hook-like inward-curved lateral papilla (copulatory organ)**, a deep cleft medial to papilla, a flask-like rugose bulb and a swelling at the dorsal edge; first 2 suckers in dorsal row distal 2 swelling greatly enlarged, followed by 3 smaller suckers, than 2 enlarged, the gradually decreasing suckers to tip; ventral rows with moderately enlarged suckers; at broad scoop-like depressed area lies between the suckers rows. **Female bursa copulatrix large, extending beyond gill insertion and covering the renal papilla in mature specimens.**

**Size:** Maximum mantle length (ML) 50 mm.

**Habitat, biology, and fisheries:** Nekto-benthic species inhabiting soft bottoms, mainly outer shelf and upper bathyal. Up to 1 000 m depth. Most common from 50 to 100 m in the Atlantic. Males and females mature between 6 and 8 month of age. The spawning period extends from March to November with a peak from spring to early summer in the Mediterranean, but it extends throughout the year in the North Atlantic. It spawns mainly in relatively shallow coastal waters (8 to 45 m), but egg masses have been found from 8 to 200 m. Smaller size of this species ascends later in the year and do not spawn before autumn. Its overall fecundity was estimated in 1 000 oocytes per female. The species has a multiple spawning strategy. The mean number of mature oocytes released at each spawning act was 54. The eggs (spherical to lemon-shaped and greyish white in colour) are deposited on ascidians (*Microcosmos* spp.), seaweed, cinder debris and other substrates in cluster of 30 to 160, most commonly between 30 and 60. Newly spawned eggs measured 2.5 mm, but 5.0 x 4.5 mm after embryonic development. At 20°C they take about 20 days to hatch. The newly hatched measure between 3 and 5 mm of mantle length. The diet of newly hatched is composed by free swimming crustaceans like mysids, amphipods, euphausiids and copepods, but adults feed mainly on large mysid and decapod shrimps. The females have longer tentacle clubs and digest more food than males at any given size. Females grow faster than females. Growth rates of 5.3 and 4.2 mm mantle length per month



for males and females respectively in the Atlantic, but between 1.2 and 1.6 mm per month for males and from 2.0 to 2.3 mm per month for females in the Mediterranean, their lower values occurring during winter and early spring and the higher ones during summer months. Total life cycle duration of 6 to 9 months. Post-spawning mortality has been observed. Its range of salinity tolerance is low (34 to 35.5). Temperature limits of this species ranged from 4 to 12°C. This species has some commercial importance and it is caught as bycatch in trawl fisheries.

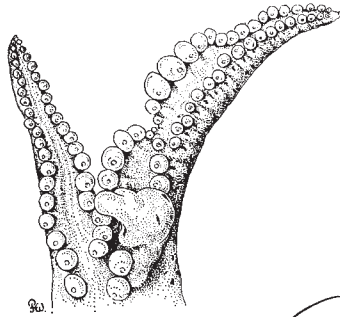
**Distribution:** Mediterranean Sea and from western Norway and the Faeroe Islands to Senegal (14°N) and Madeira.



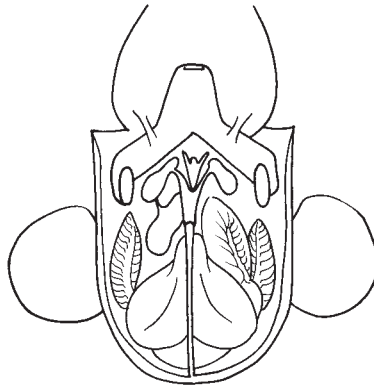
*Sepiola atlantica* d'Orbigny, 1839–1842

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

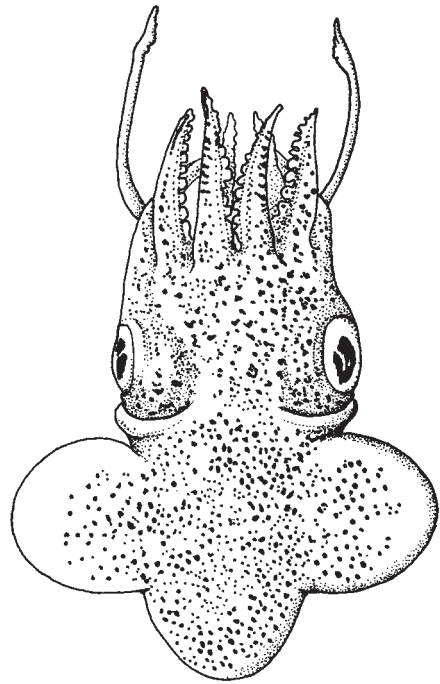
**FAO names:** **En** – Atlantic bobtail squid; **Fr** – Sépiole grandes oreilles; **Sp** – Sepiola atlántica.



hectocotylus



mantle cavity of mature female



dorsal view

**Diagnostic characters:** A pair of kidney-shaped light organs on anterior surface of ink sac. Tentacular clubs with 8 suckers in transverse rows. Suckers of the ventral arms (IV) in 2 transverse rows along almost all its length, the abruptly change into minute suckers arranged in 4 to 6 transverse rows on the apices, which are long and finger-like. Left dorsal arm hectocotylyzed by a large swollen bulb, with secondary lobes basally (copulatory organ); suckers of the dorsal row swollen basally, followed by 3 or 4 greatly reduced suckers, then by 4 or 5 greatly swollen suckers in midportion.

**Size:** Maximum mantle length (ML) 25 mm.

**Habitat, biology, and fisheries:** Nectobenthic species on muddy sandy and detritus-rich bottoms mainly covered by algae. From sublittoral (4 to 6 m) to about 100 m depth. Males reach gonadal maturity slightly early and at slightly smaller sizes (12 mm ML) than females (16 mm ML). Spawning period extends throughout the year with a peak of reproduction in spring and summer. The number of oocytes in mature females ranged from 64 to 71 (>0.2 mm diameter). In the males, the spermatophores length varies from 6.5 to 10.0 mm. The number of spermatophores per mature males was estimated to range from 59 to 338. Bimodal distribution of sizes in the population of a bay in Scotland waters in the months of May, June and July could represent 2 cohorts. In aquarium conditions, this species fed on small live crustaceans. Its luminous organs have symbiotic bacteria (*Photobacterium fischeri*). Very narrow limits of salinity tolerance, from 34 to 35.5. Temperature limits of this species ranging from 6° to 20°C. This species has not interest to fisheries.

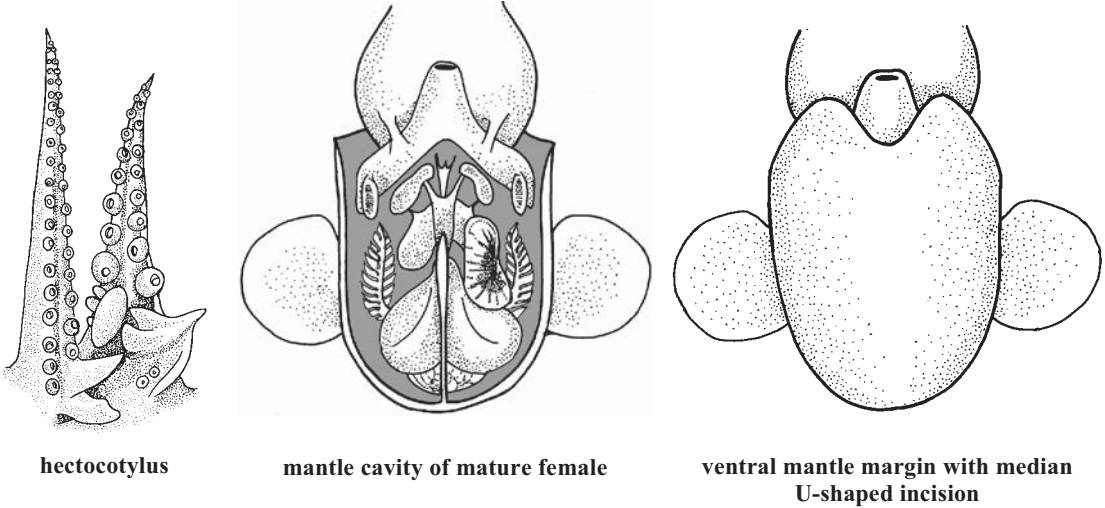
**Distribution:** Northeast Atlantic Ocean, from Iceland and Norway to northwest Africa (Morocco). The southern limits of its distribution is unknown.



*Sepiola aurantiaca* Jatta, 1896

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

**FAO names:** **En** – Golden bobtail; **Fr** – Sépiole dorée; **Sp** – Globito dorado.



hectocotylus

mantle cavity of mature female

ventral mantle margin with median U-shaped incision

**Diagnostic characters:** Ear-shaped light organs attached laterally to ink sac. Ventral mantle margin strongly produced anteriorly, with median U-shaped incision. Tentacular club with 8 rows of minute subequal suckers. Left dorsal arm of male hectocotylized (hectocotylus), with 2 small proximal suckers; stalks of third and fourth ventral suckers form large, inward-projecting processes that are connected basally with a **tooth-like structure at the end of a muscular ridge beginning lateral to the basal suckers; a rugose tubercle develops from the stalks of the second and third dorsal suckers and extends anteriorly towards the oral surface of the arm in the form of an oval pad between the first distal suckers;** about 3 pairs of enlarged suckers distal to the modification. Right dorsal arm of male with additional copulatory apparatus, consisting of 2 small tongue-like outgrowths on basal part of arm. **Bursa copulatrix in females displaces the left renal papilla and covers the genital opening.**

**Size:** Maximum mantle length 20 mm.

**Habitat, biology, and fisheries:** Biology poorly known. Outer shelf and upper bathyal. Located between 28 and 200 m and probably to 400 m depth. Not of interest to fisheries.

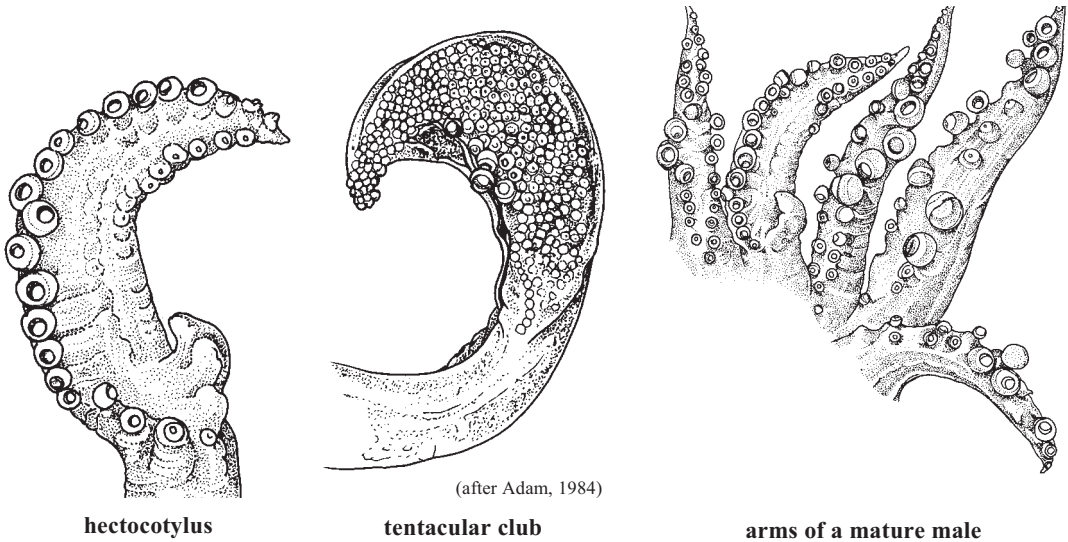
**Distribution:** Western Mediterranean, southern Norway to North Africa south to Western Sahara and Madeira.



*Sepiola knudseni* Adam, 1984

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

**FAO names:** **En** – Knudsen's bobtail squid; **Fr** – Sépiole de Knudsen; **Sp** – Globito de Knudsen.



**Diagnostic characters:** Ear-shaped light organs attached laterally to ink sac. Sucker of fourth arm in 2 rows over the entire length arm. Anterior edge of the mantle on ventral side undulates without deep incision. Left dorsal arm of male (hectocotylus) not or only slightly widened. **Copulatory apparatus of one complexly twisted lobe.** Dorsal lobe of suckers in distal part of the hectocotylized arm in males with 4 large proximal and some smaller distal suckers; in the ventral row, after the big ventral lobe with 3 lappets, there are not suckers in proximal two-thirds of the arm and some very small suckers in distal third.

**Size:** Maximum mantle length 10 mm in males, 18 mm in females.

**Habitat, biology, and fisheries:** A poorly known species from the inner shelf in 5 to 90 m. The only known predator is *Trigla lyra* (piper gurnard). Not of interest to fisheries.

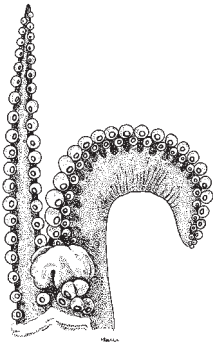
**Distribution:** Canary Islands, Senegal, Guinea, Nigeria.



***Sepiola rondeletii* Leach, 1817**

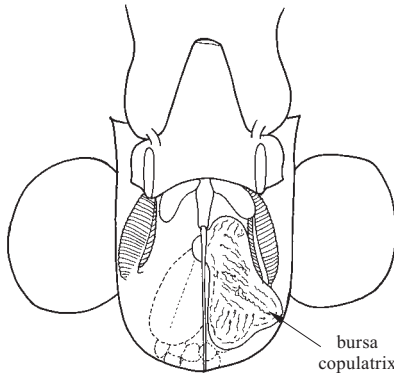
**Frequent synonyms / misidentifications:** None / None.

**FAO names:** En – Dwarf bobtail squid; Fr – Sépiole naine; Sp – Globito enano.



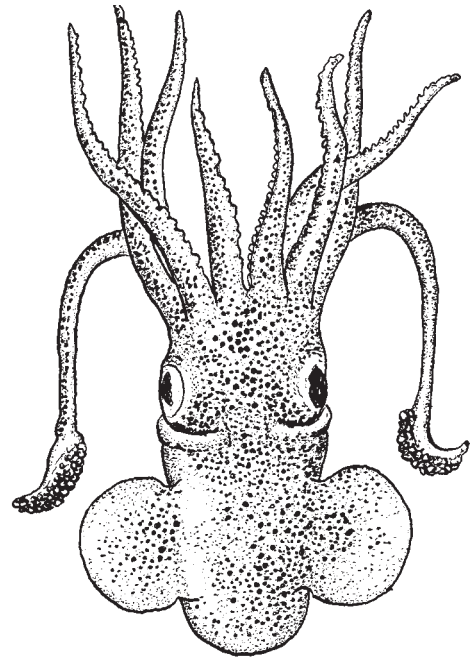
(after Naef, 1912)

**dorsal arms of male (hectocotylus)**



bursa copulatrix

**mantle cavity of mature female**



**dorsal view of female**

**Diagnostic characters:** Light organs ear-shaped, attached laterally to ink sac. Ventral mantle margin projects markedly anteriorly. Tentacular clubs with 8 suckers in transverse rows, well developed, markedly enlarged in proximal part of dorsal longitudinal rows. Left dorsal arm hectocotylized in males; there is not a groove on inner side of the hectocotylus; base of the hectocotylus with 3 equal sized suckers, **the copulatory apparatus forms an eyelet**. Mature females without mantle constrictor in the posterior left part of the mantle; **bursa copulatrix large in size, with a small caecum, just protruding into the right half of mantle cavity**.

**Size:** In the Mediterranean males up to 25 mm mantle length; females up to 35 mm mantle length. It seems that in cold Atlantic waters this species reach up to 60 mm mantle length.

**Habitat, biology, and fisheries:** Nectobenthic species on muddy sandy and detritus-rich bottoms mainly covered by algae and *Posidonia* seaweed. From sublittoral (4 to 6 m) to about 400 m depth. The spawning season extends from March though November in the western Mediterranean. All females above 30 mm mantle length are mature. Diameter of mature eggs about 6 mm. Hatchling size (ML) ranging from 3.5 to 4.2 mm. It feeds on crustaceans and small fishes. Growth rate in aquarium under 12 to 18°C was 2.5 mm mantle length per month. Longevity is estimated at about 9 to 12 months. This species has no interest to fisheries and statistics are not reported separately, it is, however, caught as bycatch in trawl fisheries as well as with purse seines and drift nets.

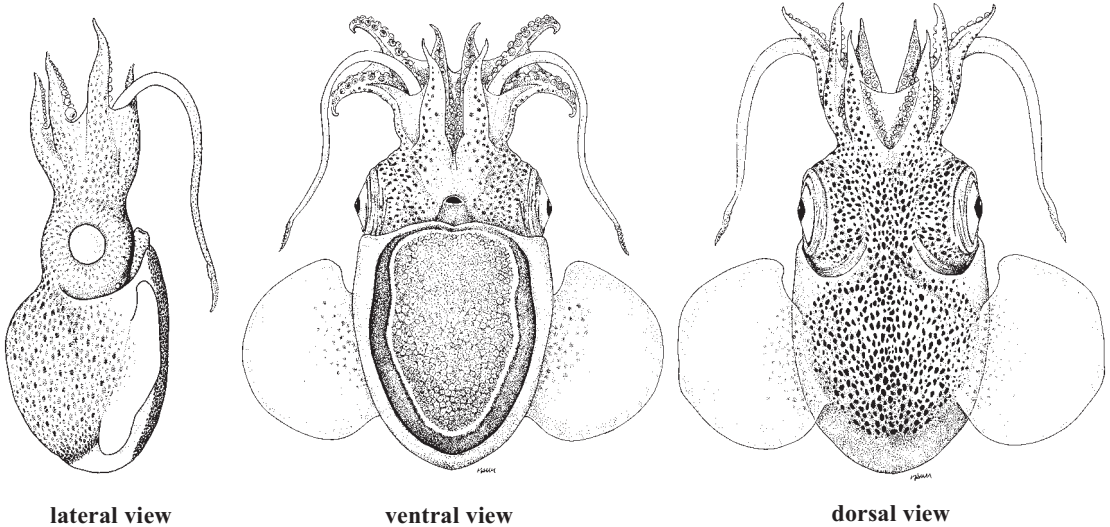
**Distribution:** Throughout the Mediterranean Sea. In the northeast Atlantic Ocean, from the North Sea to Senegal. The southern limit of its distribution is unknown.



***Stoloteuthis leucoptera* (Verrill, 1878)**

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

**FAO names:** En – Leucoptera bobtail squid; Fr – Sépiole leucoptère; Sp – Globito leucoptero.

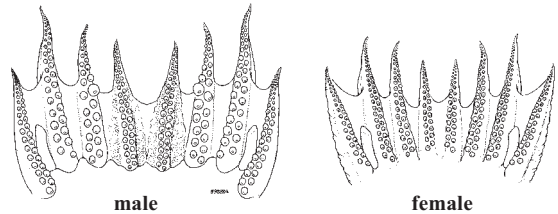


lateral view

ventral view

dorsal view

**Diagnostic characters:** Mantle developed ventrally to form a shield extending anteriorly, but not beyond anterior level of eyes, and a marked mid-dorsal bulge. Nuchal commissure narrower than head width. Posterior edges of fins rounded, do not extend beyond mantle. **Extensive web present between all arms except between ventral pair.** Arm suckers biserial except distally on arms IV, where suckers are in 3 or 4 rows in males. Arm II in males with 1 to 3 enlarged suckers at level of the fifth and sixth sucker rows. Tentacular club with aboral keel proximal to club. Large light organ on ink sac. Proximal two-thirds of arms I in males with thickened lateral membranes, containing finger-like structures and spherical bodies of unknown function.



male

female

oral view of arms

**Size:** Maximum mantle length 18 mm.

**Habitat, biology, and fisheries:** Lower sublittoral and upper bathyal; at or near the bottom in 362 to 712 m; 14 to 489 m by day and by night in midwater in 0 to 447 m. Colour pattern is cryptic for the pelagic environment and the species is probably diurnal in upper mesopelagic water. Spermatangia are attached to females on dorsal and ventral sides of head, base of web and eyelids. Not of interest to fisheries.

**Distribution:** Mediterranean, Bay of Biscay, Namibia south of 27°S and probably also further north; South African west coast, Gulf of St Lawrence to Straits of Florida. Kerguelen, Prince Edward Islands and Discovery Bank and probably off eastern Tasmania.

**Remarks:** All recorded specimens need to be investigated to check whether or not they are conspecific.



## SPIRULIDAE

## Ram's horn squid

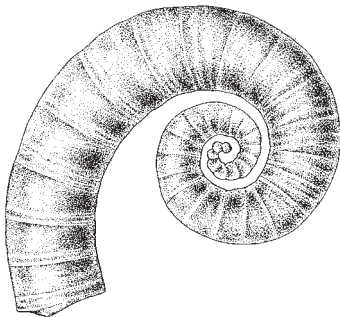
A single species in the family.

*Spirula spirula* (Linnaeus, 1758)

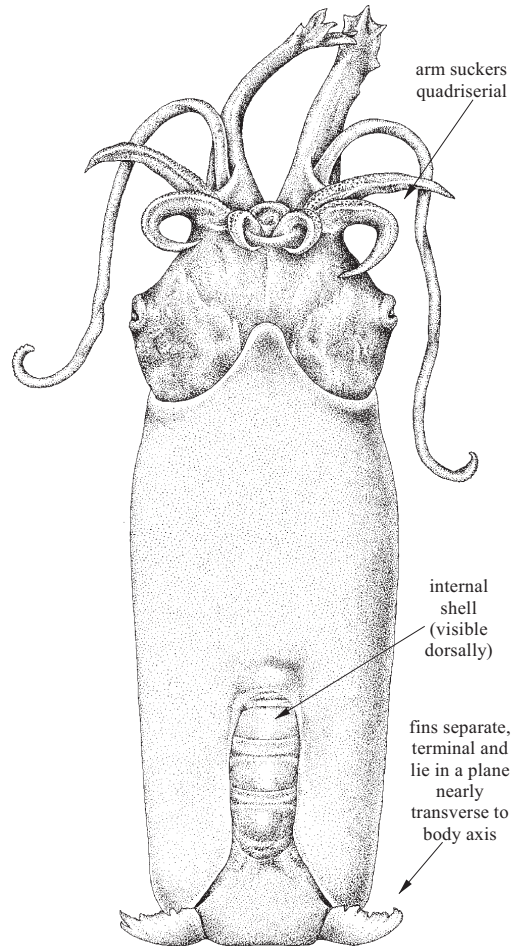
**Frequent synonyms / misidentifications:** None / None.

**FAO names:** En – Ram's horn squid; Fr – Spirule; Sp – Espirula.

**Diagnostic characters:** A small, muscular species. **Internal chambered shell spirally coiled**, located in posterior end of mantle. **Small round fins separate, terminal, nearly transverse to body axis.** Large photophore located between fins. Funnel-mantle locking cartilage a simple, straight groove and ridge. Eyes large, without cornea but with muscular eyelids. Arm lengths increase from dorsal to ventral, each arm with 4 to 6 longitudinal series of small suckers. Both ventral arms hectocotylized in males. Tentacular clubs with subequal suckers in 16 series, not divided into manus and dactylus. **Colour:** dark reddish brown. Skin smooth but mantle under skin covered with regularly aligned collagen fibrils that produce a silvery sheen.



internal shell



dorsal view of male

(illustration: K. Hollis/ABRS)

**Similar families occurring in the area**

None, no other family has a shell curved ventrally in an open coil.

**Size:** Maximum mantle length 45 mm.

**Habitat, biology, and fisheries:** This is a mesopelagic species living above continental slope at depths of 0 to 2 000 m, timed depths of 500 to 1 000 m by day, mainly in 100 to 300 m at night. The calcareous shell is used as a buoyancy device; migrates vertically; normal swimming position is head-down. Known predators include short-finned squids, splendid alfonso, swordfish and grey-faced petrels. Attains sexual maturity at about 30 mm mantle length. Eggs small, possibly laid on the bottom on the continental slope. Juveniles have been collected at about 1 000 to 1 750 m; smallest known juveniles had 2 shell chambers at mantle length  $\pm 1.5$  mm. No direct interest to fishery exists. Stranded shells sold in shell trade.

**Distribution:** Tropical and subtropical oceanic waters worldwide, in water masses where temperature is over 10°C at 400 m; empty shells are carried by currents extremely far from the natural habitat.



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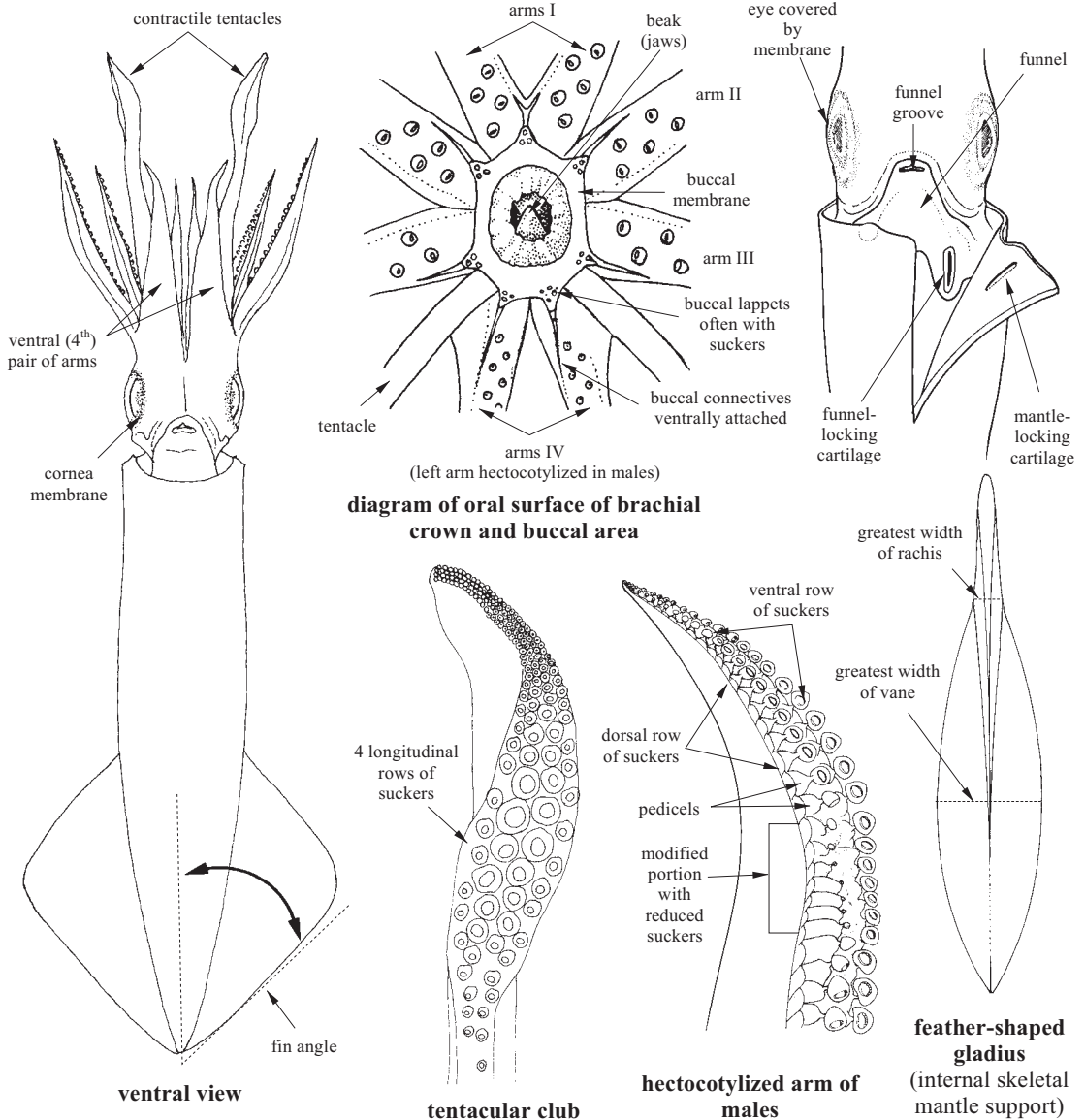
**SQUIDS**

**Myopsid Squids**

**LOLIGINIDAE**

**Inshore squids**

**D** **Diagnostic characters:** Transparent skin (corneal membrane) covers eye lens. Funnel-locking apparatus a simple, straight groove and ridge. Fins attached to lateral regions of mantle. Arms with suckers in 2 series. Tentacular club with suckers in 4 longitudinal rows. **Hooks never present.** Buccal connectives attach to ventral margins of ventral arms. **Seven buccal lappets usually possess small suckers** (absent in *Afrololigo* and *Alloteuthis*). The left ventral arm is hectocotylized in males. Eggs spawned in finger-like egg capsules attached to substrate. **Colour:** usually reddish brown, darker dorsally but quite variable, depending on behaviour.



**diagram of oral surface of brachial crown and buccal area**

**ventral view**

**tentacular club**

**hectocotylized arm of males**

**feather-shaped gladius**  
(internal skeletal mantle support)

**Habitat and biology:** Loliginids are small to large squids occurring along the coastal margins and continental shelf, primarily in warm to temperate waters worldwide. Various species occur from very shallow water in bays and estuaries, over grass flats and coral reefs, to water as deep as over 700 m (during seasonal offshore migrations). Eggs are usually attached to hard surfaces in clusters of finger-like capsules; paralarvae resemble the adults. Typically, they undertake diel migrations, aggregating near the bottom during the day but dispersing into the water column during the night.

**Remarks:** The history of nomenclature and the systematics of this family have long been problematic at least in part because of its worldwide distribution, the diversity of the group, the lack of comprehensive collections, and the scattered and often isolated literature dating from the eighteenth and nineteenth centuries (Vecchione *et al.*, 1998b). A workshop on loliginid systematics was convened during the 2003 meeting of the Cephalopod International Advisory Council held in Phuket, Thailand (Vecchione *et al.*, 2005). One goal of the workshop was to resolve conflicting generic-level classifications of the family in light of recent observations and cladistic analyses on morphological and molecular characters. The assembled taxonomic experts reached consensus on a classification which includes 10 genera and 47 species (Vecchione *et al.*, 2005). This classification is followed in this Guide.

### Similar families occurring in the area

Other squid families including commercial-sized species that present potential interest to fisheries (Ommastrephidae, Thysanoteuthidae, Onychoteuthidae) all lack suckers on the buccal lappets and have eye lenses open to the sea, not covered by a transparent corneal membrane. The funnel locking apparatus is not straight in Ommastrephidae, Thysanoteuthidae and Cycloteuthidae. Hooks are found on the arms or tentacular clubs in Onychoteuthidae, Enploteuthidae, Pyroteuthidae, Ancistrocheiridae and Octopoteuthidae. The mantle in Lepidoteuthidae and Pholidoteuthidae is covered with small integumentary scales. Brachioteuthidae, Architeuthidae, Neoteuthidae and Joubiniteuthidae can all be distinguished by more than 4 rows of suckers on the proximal part of the tentacular club. Chiroteuthidae and Mastigoteuthidae generally have greatly enlarged ventral arms, modified to hold the long, thin tentacles. The mantle is fused to the funnel and head in Cranchiidae. Non-commercial squid families differ as follows: Ctenopterygidae have comb-like fins extending nearly the full length of the mantle. Lycoteuthidae have light organs on the eyeball, viscera and tentacles. Histioteuthidae have numerous light organs on the ventral surfaces of the mantle, head and arms. Bathyteuthidae are small, deep-sea squids with very short arms joined by a low, fleshy web.

### Key to the species of Loliginidae occurring in the area

- 1a. Fins transversely oval, rounded posteriorly, without tail; very small squids, maturing at 20 mm mantle length; light organs only in female; buccal lappets without suckers . . . . . ***Afrololigo mercatoris***
- 1b. Fins rhomboidal or heart-shaped, longer than wide, tail present or absent; medium- to large-sized squids; light organs absent; buccal lappets with or without suckers . . . . . → 2
- 2a. Fins drawn out into a long tail<sup>1/</sup>; buccal lappets without suckers . . . . . ***Alloteuthis* → 3**
- 2b. Fins not drawn out into a long tail; buccal lappets with suckers . . . . . ***Loligo* → 5**
- 3a. Mature squids with relatively short tail; tail length less than half fin length; fin length (with tail) not more than half mantle length . . . . . ***Alloteuthis media***
- 3b. Mature squids with long tail; tail length not less than half fin width; fin length (with tail) more than half mantle length . . . . . → 4
- 4a. Fin length (with tail) in males not more than 3 times their width; in females not more than 2 times their width; club narrow, pairs of median suckers set oblique to longitudinal club axis, at an angle of about 45° . . . . . ***Alloteuthis subulata***
- 4b. Fin length (with tail) in males not less than 4 times their width; in females not less than 2 times their width; club wide, pairs of median suckers set almost perpendicular to longitudinal club axis . . . . . ***Alloteuthis africana***

<sup>1/</sup> Recent data provide evidence that this character can be misleading (Anderson *et al.*, 2008). However, until additional information is provided and the taxonomic status of the 3 nominal species is resolved, it is maintained here.

- 5a.** Median suckers of tentacular clubs about 1.5 times as large as lateral club suckers; elongate flame-like blotches present on ventrolateral mantle in males . . . . . ***Loligo forbesii***
- 5b.** Median suckers of tentacular clubs about 3 to 4 times as large as lateral club suckers; elongate flame-like blotches only seldom present on ventrolateral mantle in males . . . . . → **6**
- 6a.** In males, horny rings of largest club suckers smooth (a few teeth may occur in rings of small animals) . . . . . ***Loligo reynaudii***
- 6b.** In males, horny rings of largest club suckers bear several groups of sharp teeth, not arranged in any distinct sequence (only a few teeth may remain in rings of large males) . . . . . ***Loligo vulgaris***

**Remarks:** In spite of the low level of species diversity, *Alloteuthis* taxonomy and systematics are confused and assignment of specimens to species may be difficult. Recent analyses of populations of *A. media* and *A. subulata* from the eastern Mediterranean and the northwestern African waters indicate that a species complex probably exists that requires realignment of previous concepts of these 2 nominal species. Subsequent molecular phylogenetic studies reveal clades that do not correspond to the traditionally recognized *Alloteuthis* species. More recent data provide evidence that the character often used to distinguish *Alloteuthis* species (relative fin length) can be misleading. Clearly, further studies are required to help define the whole species complex. Until the taxonomic situation is resolved, we retain the three nominal species here as separate entities.

#### List of species occurring in the area

The symbol 🦑 is given when species are included.

- 🦑 *Afrololigo mercatoris* (Adam, 1941).
- 🦑 *Alloteuthis africana* Adam, 1950.
- 🦑 *Alloteuthis media* (Linnaeus, 1758).
- 🦑 *Alloteuthis subulata* (Lamarck, 1798).
- 🦑 *Loligo forbesii* Steenstrup, 1856.
- 🦑 *Loligo reynaudii* d'Orbigny, 1941.
- 🦑 *Loligo vulgaris* Lamarck, 1798.

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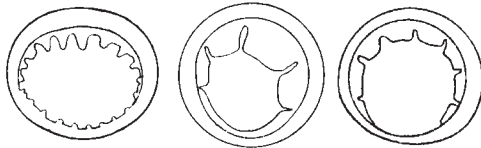
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***Afrololigo mercatoris* (Adam, 1941)**

**Frequent synonyms / misidentifications:** *Lolliguncula mercatoris* Adam, 1941, Roper *et al.* (1984) / None.

**FAO names:** En – Guinean thumbstall squid; Fr – Calmar doigtier de Guinée; Sp – Calamar dedal de Guinea.



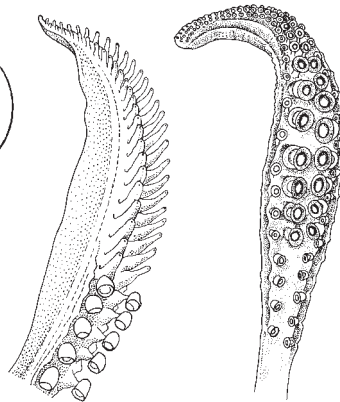
tentacular club  
sucker ring

male

arm III sucker rings

female

arm III sucker rings



left ventral arm

(IV) of male  
hectocotylized

tentacular club

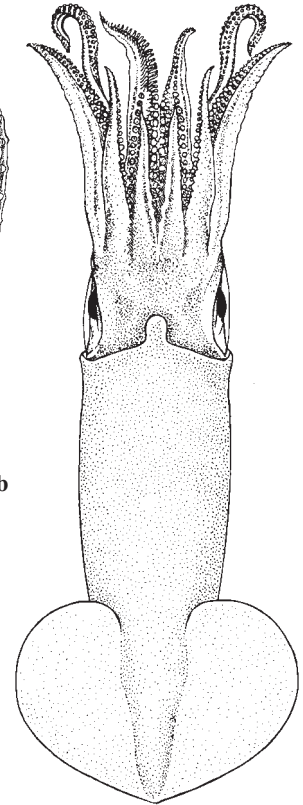
**Diagnostic characters:** Mantle broad (its width about 35% of dorsal ML) and bluntly rounded posteriorly. **Fins rounded, short** (their length 30 to 52% of dorsal ML), broad (width across both fins 47 to 78% of dorsal ML) with convex posterior margins. Head short; buccal lappets without suckers. Tentacular **clubs narrow, small, with quadriserial suckers, 4 or 5 pairs of median manus suckers much larger than the laterals**, though not nearly as large as the lateral arm suckers in males; club sucker rings with 15 to 25 more or less sharp teeth that are larger and more pointed distally. Dorsal arms (I) extremely short in comparison to the others; ventral suckers on the lateral arms (II and III) much larger than dorsal suckers, especially in males. Horny rings of arm suckers with 1 to 9 large, rectangular teeth distally and laterally, the proximal edge smooth. Left ventral arm (IV) of males hectocotylized, its proximal half with 6 to 12 pairs of normal suckers, the distal half with elongate papillae replacing the suckers, papillae of the dorsal row more strongly developed than the ventral ones. Spermatophore pad of females located in mantle cavity, near gill. **Colour:** reddish to brownish.

**Size:** Maximum mantle length in females is 50 mm and in males 35 mm.

**Habitat, biology, and fisheries:** Neritic, nearshore species, most abundant in water shallower than 50 m on mud and sandy mud bottoms but found from the surface down to 252 m. Very little is known about the biology of this species. Known predators are butterfly ray, shallow-water and deep-water Cape hakes and snoek. Currently not exploited, taken incidentally as bycatch in large numbers by research midwater trawls off the South African west coast in summer, but body size probably too small to support a fishery; also captured at night when they concentrate at the 'lumiere des lamparos'; and caught in plankton nets, midwater trawls, bottom and shrimp trawls and even a large dredge.

**Distribution:** Angra de Cintra (Golfe de Cintra,  $\pm 23^{\circ}\text{N}$ ), Western Sahara, to Port Alfred ( $33^{\circ}38'\text{S}$ ,  $26^{\circ}56'\text{E}$ ), South Africa.

**Remarks:** Juveniles are very difficult to distinguish from early stages of *Loligo reynaudii* and *L. vulgaris* and, consequently, studies of early life history are complicated, but paralarvae can now be differentiated.



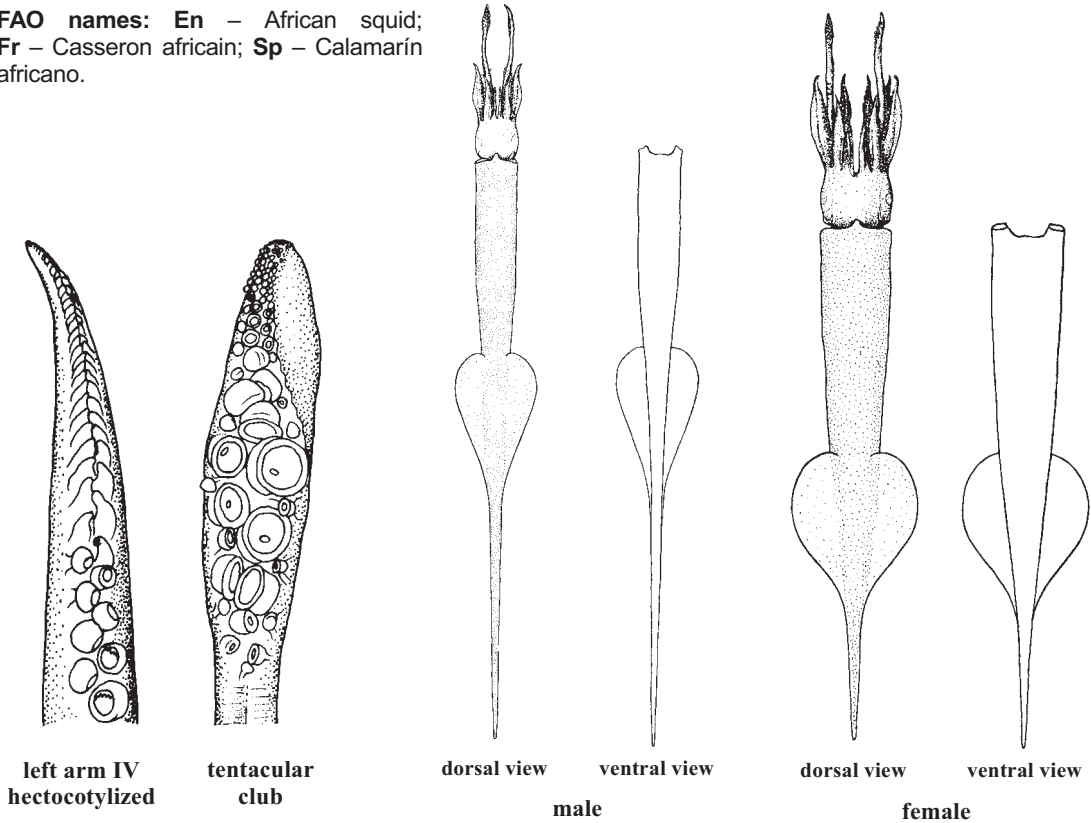
dorsal view



*Alloteuthis africana* Adam, 1950

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

**FAO names:** **En** – African squid;  
**Fr** – Casseron africain; **Sp** – Calamarín africano.



**Diagnostic characters:** Mantle long and narrow. Mantle width ranging from 20 to 25% of dorsal mantle length in juveniles, 15% in adult females and 5% in adult males. Anterior ventral mantle margin squarish in outline. **Tail** (posterior projection of fins and mantle) **very long and pointed in females** (37% ML in juveniles and 58% ML in adults) **and extremely long and spike-like in males** (35% ML in juveniles, 73% ML in adults). Fins oval in outline, with concave posterior borders. Fin width index 23% in adult females and 10% mantle length in adult males. **Tentacles short**, less than mantle length plus head length. **Tentacular club small and narrow, provided with 4 longitudinal rows of suckers, club sucker diameter of 2 median rows 3 times greater than lateral suckers**; rings of largest sucker with 20 to 30 blunt teeth. Left ventral arm (IV) hectocotylized by modification of two-fifths of length, with 8 to 11 pairs of normal suckers proximally followed by 2 longitudinal rows of more or less elongate papillae very thin on the apex. Arm suckers with 6 to 10 square teeth on distal half and smooth on proximal one. **Buccal lappets without suckers.**

**Size:** Maximum mantle length 205 mm in males and 175 mm in females.

**Habitat, biology, and fisheries:** A nectobenthic neritic species inhabiting from the surface to about 500 m. It feed on small fishes. Daily growth rate in mantle length in this species increased from 1.2 mm per day at age 90 days to 1.8 mm per day at age 150 days, and then decreased slightly. Daily growth rate in body weight increased at age 90 to 120 days and gradually falling in older animals. Specimens of 120 days have 4 g BW, and those 180 days old 7 g body weight. The maximum ages were 208 days (205 mm ML) for males and 187 days (155 mm ML) for females. This suggests that males may live longer than females and that the life cycle of this squid in west Sahara waters does not significantly exceed 6 months for animals hatching between January and May. Some animals (mostly large males) lived 7 to 8 months. The species mature over a wide

range of sizes and ages (from 120 to 180 days) on the West African shelf. Hatching period extends from January to July, with a peak in March–May in that region. *Alloteuthis africana* is caught as bycatch in local trawl fisheries. Separate statistics are not reported for this species.

**Distribution:** Eastern Atlantic from 25°N (Western Sahara) to 20°S (Namibia).

**Remarks:** Analyses of morphometric data suggest that head width can be used to separate *A. africana* from the other 2 species (Anderson *et al.*, 2008).



***Alloteuthis media*** (Linnaeus, 1758)

**Frequent synonyms / misidentifications:** None / *Alloteuthis subulata* (Lamarck, 1798) (immature males).

**FAO names:** En – Midsize squid; Fr – Casseron bambou; Sp – Calamarín menor.

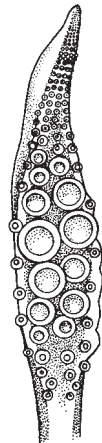
**Diagnostic characters:** Mantle long and relatively narrow, its posterior end drawn out into a pointed tail, up to 6 mm in adults. Fins heart-shaped and with their lateral angles rounded, their posterior borders concave and extending along tail. **Fin length from 45 to 52% mantle length in specimens up to 30 mm mantle length.** Left ventral arm (arm IV) hectocotyized provided with 10 to 12 normal suckers in median row and 2 longitudinal rows of coarse papillae. Tentacles very long, longer than mantle length plus head length in life (tentacular stalks contract after preservation). Tentacular club large and expanded, with 4 longitudinal rows of suckers; sucker diameter 9 to 14% of head width. **The suckers on the manus of the club disposed in transverse rows perpendicular to longitudinal club axis. Buccal lappets without suckers.**

**Size:** Maximum mantle length 132 mm in females and 88 mm in males.

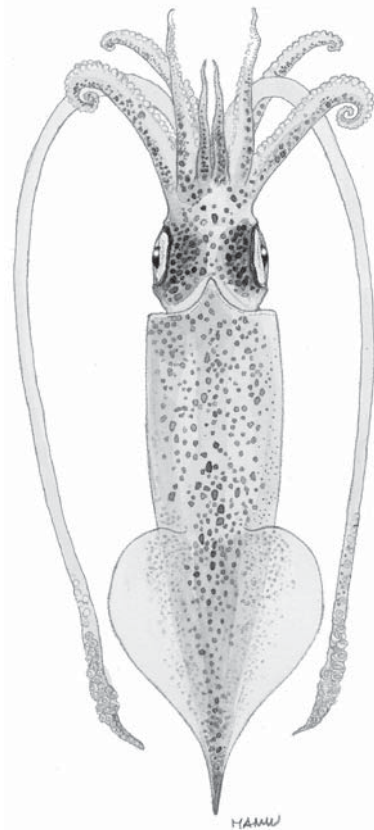
**Habitat, biology, and fisheries:** Nektobenthic and neritic species inhabiting over sandy detritic and muddy bottoms from the surface to 350 m, but mainly occurring from 20 to 200 m depth. The species undertakes seasonal migrations between offshore and inshore waters. The spawning season extends throughout the year, with 2 peaks in spring and autumn. The species has an intermittent terminal spawning reproductive strategy. Population structure shows successive cohorts recruited at different periods of the year. Length at first maturity in females is about 95 mm mantle length, but males are more precocious (55 mm ML). Eggs (1.5 x 1.1 mm) are encapsulated in short gelatinous strings, which are attached to various hard objects on the substrate. The species fed on crustaceans and small fishes. Newly hatched are planktonic. Longevity is about 1 year. Post-spawning mortality has been observed. This species is captured as bycatch in local trawl fisheries. It is frequently mistaken for juveniles of *Loligo vulgaris* and *L. forbesii*. Separate statistics are not reported.

**Distribution:** Relatively common in the eastern Atlantic from 60°N to 21°N (Cape Blanc), rare in the North Sea; common in the Mediterranean Sea.

**Remarks:** Morphometric analyses indicate that central club sucker size is a reliable character to separate *A. media* from *A. subulata* (Anderson *et al.*, 2008).



tentacular club



dorsal view





***Alloteuthis subulata* (Lamarck, 1798)**

**Frequent synonyms / misidentifications:** None / *Alloteuthis media* (Linnaeus, 1758); *A. africana* Adam, 1959.

**FAO names:** **En** – European common squid; **Fr** – Casseron commun; **Sp** – Calamarín picudo.

**Diagnostic characters:** Mantle long and narrow. **Tail long and pointed in adult females** (always longer than 6 mm), **very long** (20 to 60 mm) **and spike-like in adult males**. Fins heart-shaped, with pointed lateral angles, their posterior borders concave and extending along tail. **Fin length 52 to 70% mantle length in specimens up to 30 mm mantle length.** Left ventral arm (arm IV) hectocotylized with 13 to 16 normal suckers proximally and 2 longitudinal rows of fine, thin papillae distally. Tentacles short, less than mantle length plus head length. Tentacular club small and narrow, provided with 4 longitudinal rows of suckers; sucker diameter greater than 6 to 8% head width. **The suckers on the manus of the club disposed in oblique rows respect its longitudinal axis.** Buccal lappets without suckers.

**Size:** Maximum mantle length 215 mm in males and 150 mm in females.

**Habitat, biology, and fisheries:** Nekto-benthic and neritic species inhabiting over sandy detritic and muddy bottoms, occurring from the surface to 500 m, mainly from 20 to 200–350 m depth. The species undertakes reproductive migrations towards inshore waters. In the West African shelf, the species show a major spawning period between March and May, with a second spawning peak in autumn. The species has an intermittent terminal spawning reproductive strategy. Eggs (size from 1.5 to 2.3 mm) are encapsulated in gelatinous strings of 20 to 40 mm length, which are attached to various hard objects on the substrate. The duration of the embryonic development at 15° to 18°C is of 3 weeks. Growth rate varies between 0.3 and 1 mm mantle length per day in both sexes, its longevity ranging between 1 and 2 years in cold and temperate waters. Age of adult mature males does not exceed 8 months, that of females 6 months. Population structure shows successive cohorts recruited at different periods of the year. The species mature over a wide range of sizes and ages (from 120 to 180 days). Hatching between January and May is about 6 months, much shorter than that of this species in east northern temperate range. Longevity in the waters off west Sahara is 1 year. Post-spawning mortality has been observed. This species shows a schooling pattern similar to that described in fish. This species is captured as bycatch in local trawl fisheries. The seasonal catch rate patterns from the whole. It is frequently mistaken for juveniles of *Loligo vulgaris* and *L. forbeisi*. Separate statistics are not reported.

**Distribution:** Relatively common in the eastern Atlantic from 60° to 10°N (Guinea), frequent in the Baltic and North Sea; rare in the Mediterranean Sea.

**Remarks:** Morphometric analyses indicate that central club sucker size is a reliable character to separate *A. media* from *A. subulata* (Anderson *et al.*, 2008).



tentacular club

(after Guerra, 1992)



male

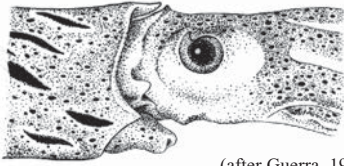
dorsal view



***Loligo forbesii* Steenstrup, 1856**

**Frequent synonyms / misidentifications:** None / *Loligo vulgaris* Lamarck, 1798.

**FAO names:** En – Veined squid; Fr – Encomet veiné; Sp – Calamar veteado.



(after Guerra, 1992)

**eye detail**

**Diagnostic characters:** Mantle long and cylindrical. **Fins rhomboid, length in adults about 75% mantle length.** Locking cartilages simple. **Eyes larger than in *Loligo vulgaris*.** Arm sucker rings with 20 to 30 sharp conical subequal teeth over the entire ring. Hectocotylus present in males, one-third of left ventral arm modified.

Tentacles not retractile, **tentacular club with 4 longitudinal rows of suckers, of which the suckers in the medial rows are slightly larger (1.5 times) than in the lateral rows.** Tiny suckers with 12 to 15 obtuse teeth present on lappets of the buccal membrane. **Colour:** long lines of bordeaux red chromatophores present on the anterior and ventrolateral surfaces of the mantle.

**Size:** Maximum mantle length 937 mm in males and 462 mm in females.

**Habitat, biology, and fisheries:** A nektobenthic species inhabiting subtropical and temperate waters (above 8.5°C). It is located in schools from the surface to 400 m depth and is most abundant from 20 to 200 m, grouped near the bottom during the day and dispersed in the water column at lower depths at night. Undertakes vertical and horizontal migrations related to feeding and reproduction throughout its life cycle. Finger-shaped egg-masses are attached to various substrates at depths of 20 to 50 m. The length of the eggs is about 3.3 x 2.4 mm. The main spawning peak is centred in winter-spring. At lower latitudes, spawning occurs earlier (in late autumn–early winter). The estimated number of oocytes in the ovary was  $14\,965 \pm 1\,137$ . Maximum major axis of mature oocytes in the oviducts was 4.3 mm. This species is considered to be an intermittent terminal spawner. Females mature at a smaller size than males. Both sexes mature at the age of approximately 5 months. Juveniles recruit to the fishery at approximately 4 months of age. The diet was composed of Teleostei, Crustacea and Cephalopoda, in decreasing order of importance. The growth rate ranged from 0.89 and 2.0 mm/day, but varied depending on the month of hatching, while the instantaneous relative growth rate ranged from 0.46 and 0.90. The life span varies from 15 to 18 months. A study of geographic variation suggested that *L. forbesii* in the Azores may reasonably be regarded as a distinct stock, differing from *L. forbesii* on the continental shelf. This species is fished as bycatch in bottom and pelagic trawls and to a lesser extent with gillnets and trammel nets. It is also a target species in the hand-jigging, artisanal, coastal fishery, mainly in the Spain, Portugal, British Isles, Ireland and France. This species is marketed together with *Loligo vulgaris* and, frequently the 2 species are not recorded separately in official statistics. During the last 10 years, *L. forbesii* has gradually disappeared from the Iberian Atlantic waters and apparently also further south, on the northwest African coast.

**Distribution:** Eastern Atlantic from the North Sea and British Isles (55°N) to Senegal, mainly north of 24°N; Azores; Mediterranean Sea; Red Sea.

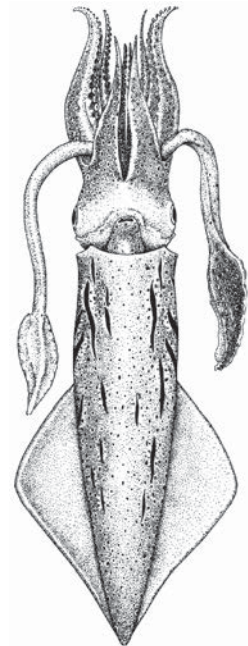


**left arm IV of male  
hectocotylized**



**tentacular  
club**

(after Guerra, 1992)



**ventral view**

(after Guerra, 1992)



***Loligo reynaudii* d'Orbigny, 1839–1841**

**Frequent synonyms / misidentifications:** *Loligo vulgaris reynaudii* Augustyn and Grant, 1988 / None.

**FAO names:** **En** – Cape Hope squid; **Fr** – Calmar du Cap; **Sp** – Calamar del Cabo.

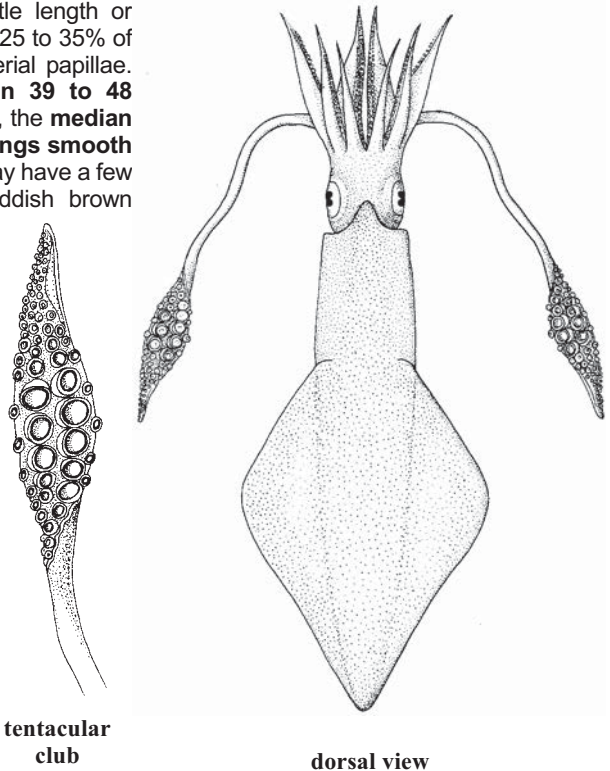
**Diagnostic characters:** Fins long, 65% mantle length or more. Left ventral arm hectocotylized, the distal 25 to 35% of arm length modified and bearing 44 to 68 biserial papillae. **Tentacular clubs** expanded, **with suckers in 39 to 48 transverse rows** (35 to 37 rows in *L. vulgaris*), the **median manus suckers** greatly enlarged, their **horny rings smooth from 78 mm mantle length** (smaller animals may have a few teeth in the large club suckers). **Colour:** reddish brown chromatophores present on head and mantle; when alive, the colour can change from dark red to almost translucent.

**Size:** Males larger than females, maximum mantle length 400 mm, females up to 240 mm.

**Habitat, biology, and fisheries:** A neritic, nekto-benthic species, widely distributed over the continental shelf and slope, at depths of 0 to 384 m (136 to 300 m by day); migrate vertically after dark. The west coast population, found to greater depths than on the south coast, consists mainly of immature and maturing subadults, is continuous with that on the south coast and constitutes a significant but highly variable part of the biomass. It is an opportunistic predator taking a wide size range of prey. Adults feed on polychaetes, crustaceans, cephalopods and teleost fish larvae and juveniles.

Cannibalism is generally low offshore, but increases on the spawning grounds. *L. reynaudii* is preyed upon by a wide variety of opportunistic predators, including skates, rays and sharks, a large number of teleost fishes, seals, dolphins and seabirds. Immature males and females are usually in separate schools on the shelf. Maturation takes place during migration back to the spawning grounds, where the schools mix. Size at maturity is highly variable (males 264 to 346 mm, females 166 to 244 mm ML). Spawning and hatching is mainly from September to December inshore, in less than 40 m; when inshore conditions are unfavourable, the species may spawn offshore, in shelf waters deeper than 100 m. Egg beds range from small clusters of 100 to 1 000 capsules to dense beds several metres in diameter. Egg capsules contain 94 to 126 eggs, attached by stalks usually embedded in the substrate. The fishery is mainly restricted to the southeast coast of South Africa; inshore spawning aggregations support a substantial jigging fishery with night lights in about 15 to 40 m; catches on spawning grounds are usually best at sea surface temperature of 18 to 23°C. The resource has a history of fluctuating abundance. The species is also an important bycatch of demersal trawlers.

**Distribution:** Southeastern Atlantic, from northern Namibia to the Ntlonyane River, Eastern Cape (32.25°S, 28.98°E), South Africa; possibly also southern Angola.



***Loligo vulgaris* Lamarck, 1798**

**Frequent synonyms / misidentifications:** None / *Loligo forbesii* (formerly, multiple authors).

**FAO names:** En – European squid; Fr – Calmar commun; Sp – Calamar común.

**Diagnostic characters:** Fin length exceeds 50% mantle length. Left ventral arm of male hectocotylized, the distal 25 to 33% of arm length modified and bearing 50 to 62 biserial papillae. Tentacular club with **35 to 37 transverse rows of suckers, of which the median manus suckers are larger than the marginal ones; median manus sucker rings bear teeth, varying from small teeth around most of the ring in some smaller specimens, to a few distal teeth in some larger specimens.** A greenish blue iridescence present in the posterior part of the mantle in live or fresh specimens.

**Size:** Maximum mantle length 640 mm in males and 485 mm in females.

**Habitat, biology, and fisheries:** A nektonic species inhabiting temperate waters. Located in schools from the surface to 550 m depth and most abundant from 20 to 200 m. This species undertakes vertical and horizontal migrations related to feeding and reproduction throughout its life cycle. Its potential fecundity ranges from 780 to 74 000 oocytes. Finger-like egg capsules are attached to several substrates below 200 m depth. Full maturity occurred at smaller sizes in Portuguese waters than in the remaining Atlantic waters. This species is considered to be an intermittent terminal spawner. Males mature earlier than females. Juveniles recruit to the fishery at about 3 to 4 months of age. The diet is composed of Teleostei, Cephalopoda, Crustacea and Polychaeta, in decreasing order of importance; cannibalism has also been observed. There are 2 hatching peaks: in winter–spring, eventually resulting in larger sized animals, and in summer–autumn. The life span is about 1 year for males and females. The age at first maturity is variable among areas, and is frequently more than 150 mm mantle length in both sexes. The biological variability of *L. vulgaris* between areas is considered to be related to plasticity of response to large-scale geographic environmental conditions. This species is taken throughout the year as bycatch in bottom trawl, gill and trammel nets and also as target species in the hand-jig artisanal coastal fishery in depths between 20 and 350 m in the Mediterranean, off West Africa and the northeastern Atlantic. *L. vulgaris* is an important secondary target species in the Saharan Bank cephalopod trawl fishery. Frequently, *L. vulgaris* and *L. forbesii* species are not separated in official statistics.

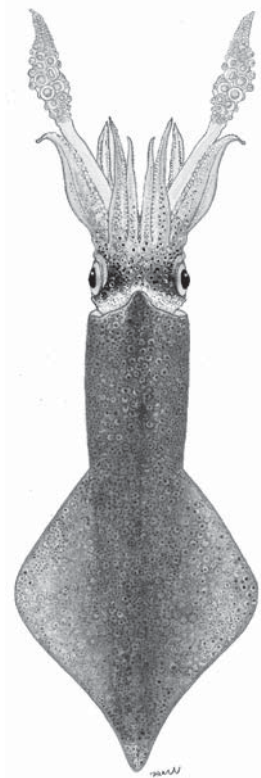
**Distribution:** Eastern Atlantic from the North Sea and British Isles (55°N) to northern Namibia (20°S); Mediterranean Sea.



**tentacular club**  
(after Guerra, 1992)



**eye detail**  
(after Guerra, 1992)



**ventral view**



## ANCISTROCHEIRIDAE

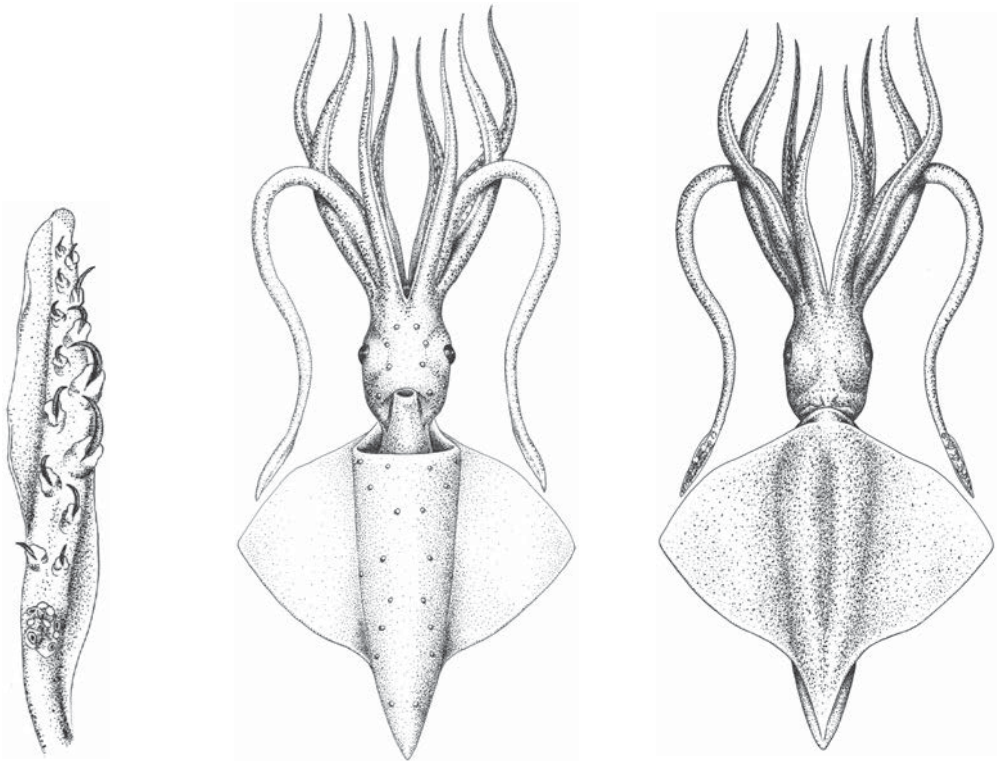
### Sharpear enope squids

This monotypic family contains a single species. Consequently, diagnostic characters, habitat, biology and interest to fisheries coincide.

*Ancistrocheirus lesueurii* (d'Orbigny, 1842)

**Frequent synonyms / misidentifications:** *Onychoteuthis lesueurii* Orbigny 1839; *Theliodioteuthis alsessandrini* (Vérany, 1851) / None.

**FAO names:** **En** – Sharpear enope squid; **Fr** – Encornet cachalot; **Sp** – Enoploluria rómbica.



tentacular club

ventral view

dorsal view

(all illustrations from Guerra, 1992)

**Diagnostic characters:** Funnel locking cartilage simple. **Arms thick with 2 rows of hooks (10 to 15 pairs); small, stalked suckers may be present on arm tips. Tentacles robust with 12 to 28 photophores** along the aboral side of the stalk, clubs narrow, unexpanded, with a distinct carpal cluster. Manus with 2 rows of sharp hooks. **Ventral surface of mantle studded with 20 to 24 relatively large, separated photophores arranged in transverse rows of 2 or 4.** A pair of photophores near the distal end of the funnel groove, 4 ventrolateral pairs in the head, 2 pairs in the dorsal surface of the head and 1 near each eye.

#### Similar families occurring in the area

Octopoteuthidae lacks tentacles beyond the paralarval stage; has buccal membrane connectives attached ventrally to the vental arms.

**Size:** Maximum mantle length 400 mm.

Enoploteuthidae has light organs on the ventral surface of the eyeball; lacks distinctive large light organs of this family.

Thysanoteuthidae has a complex funnel-locking apparatus; lacks arm hooks and large light organs on head and mantle.

Cycloteuthidae has buccal membrane connectives attached ventrally to the ventral arms; has a complex funnel-locking apparatus; lacks arm hooks and large light organs on head and mantle.

**Habitat, biology, and fisheries:** Epi- mesopelagic species inhabiting the water column, at least, up to 700 m. The adults seem to undertake the spawning near the bottom. Planktonic juveniles. This species has nidamental glands and therefore can produce egg mass. Potential fecundity in prespawning specimens varies from 195 000 to 790 000 eggs. Relative fecundity of the maturing squid is about 430 eggs/g, and 230 eggs/g in the mature female. Ripe egg dimensions were 1.91 to 2.6 x 1.5 to 1.6 mm. There are about 7 000 ripe eggs in the oviducts of mature female. In all squid studied no copulation traces were found on the nuchal cartilage, buccal membrane, inside the mantle or on the outer surface of the body. Life span is between 1 and 2 years. It posses a high concentration of ammonium in body tissues, probably related to buoyancy. No interest to fisheries.

**Distribution:** Cosmopolitan species in tropical and temperate waters.

**Remarks:** Until recently, this family was considered to be a subfamily of the Enoploteuthidae. Although only a single species is recognized in the family, differences in paralarval morphology between Atlantic and Pacific specimens suggests that more than 1 species exists (Young *et al.*, 1992).



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## ARCHITEUTHIDAE

### Giant squids

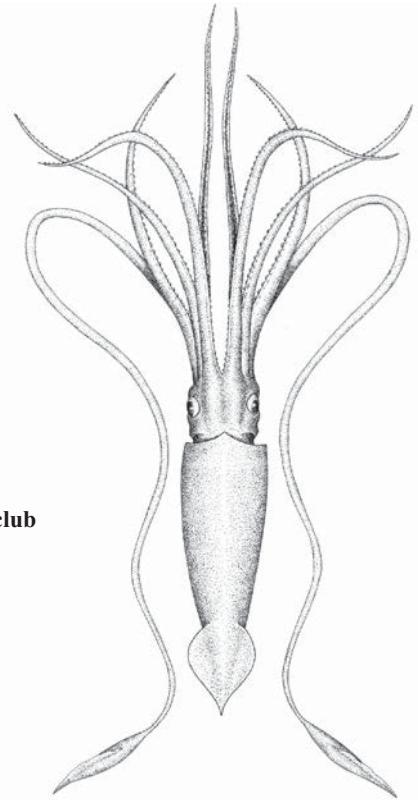
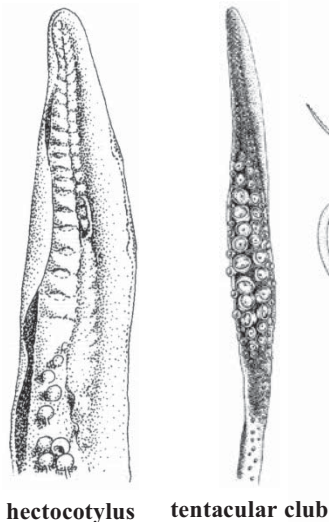
The family is monotypic, consequently diagnostic characters, habitat, biology and interest to fisheries coincide with those of the genus.

*Architeuthis* Steenstrup, 1857

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

**FAO names:** En – Giant squid; Fr – Encornet monstre; Sp – Megaluria.

**Diagnostic characters:** Huge animals, among the largest of all molluscs. Mantle narrow, posteriorly acuminate and attenuated into a short tail. **Arms very long**, about as long as the mantle, with biserial suckers; **tentacles may be extremely long**, reputedly up to 8 times as long as the mantle but more reliably 1 to 3.6 times mantle length. **Tentacular clubs elongate, narrow, with suckers in 4 longitudinal series on the manus, those of the 2 middle series enlarged; carpus with a clump of 15 to 44 irregularly arranged toothed suckers; fixing apparatus with a large cluster of very numerous (34 to 74) small smooth-ringed suckers and knobs, extending proximally in more and more widely spaced pairs along the stalk, almost to the tentacle base; proximal 11 to 28% of the tentacle length bare, with no suckers or knobs.** Locking cartilages simple, straight ridge and groove. Males with a long muscular terminal organ (penis) of about 70% mantle length. **Tips of both ventral arms of male hectocotylized.** **Fins small, ovate, without free anterior or posterior lobes, not reaching the end of the tail;** posterior edges of fins concave. Buccal connectives attach to dorsal borders of ventral arms. **Colour:** skin, when undamaged, brick red; lining of mantle cavity the same colour.



**dorsal view**

(all illustrations from Guerra, 1992)

**Size:** Maximum mantle length up to about 3 m, more often between 1 and 2 m; up to 18 m total length, but more commonly 6 to 12 m.

**Habitat, biology, and fisheries:** Oceanic species, the young inhabiting midwater (epipelagic and mostly mesopelagic between 200 and 1 000 m.), while adults live in the epipelagic and mesopelagic zones and over the bottom in the bathyal; frequently found over submarine rises and canyons at depths from 125 to 620 m, they occasionally range as deep as 1 000 m. These animals are often stranded near the coast. The diet of these species consists mainly of fish and to a lesser extent of other cephalopods and crustaceans. *Architeuthis* constitutes a major food supply for sperm whales. Other known predators are sharks, large fishes such as lancetfish and tuna, other cetaceans or albatrosses. Sex ratio clearly biased towards females. Males mature at much smaller sizes (at about 1 m ML) than females. A number of mature males have been found with spermatophores embedded in the skin of several arms, the head, mantle and penis. Spawning season unknown. Potential fecundity was estimated to be around 5 to 12 x 10<sup>6</sup> oocytes. Egg diameter small,

from 1.2 to 1.8 mm. Spermatophores long, from 55 to 204 mm. The maximum estimated age is about 2 to 3 years, although this issue is under discussion. This species has no commercial value due to the low number of specimens collected and mainly, the high ammonium content in the flesh.

**Distribution:** Cosmopolitan genus. Relatively abundant in waters of the northeastern and northwestern Atlantic, southern Africa, Australia and New Zealand.

**Remarks:** The systematics of *Architeuthis* is confused and poorly known. Twenty-one nominal species have been described, some of which are clearly invalid. Currently, 3 species are considered valid by some authors, while others regard these 3 entities as subspecies of *Architeuthis dux*: *A. dux dux* in the Atlantic, *A. dux martensii* in the North Pacific and *A. dux sanctipauli* in the southern hemisphere.



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## BATHYTEUTHIDAE

### Deepsea squids

The family is monotypic, consequently diagnostic characters, habitat, biology and interest to fisheries coincide with those of the genus.

*Bathyteuthis abyssicola* Hoyle, 1885

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

**FAO names:** **En** – Bathyal deepsea squid; **Fr** – Loutène abyssale; **Sp** – Batiluria abisal.

**Diagnostic characters:** Mantle robust and round-shaped posteriorly. **Fins small, round, separate and short.** **Eyes orient slightly anteriorly.** Buccal connectives attached to the dorsal borders of ventral arms, suckers on the buccal lappets. **Clubs unexpanded, short, with 8 to 10 rows of minute suckers.** Arms shorts with suckers arranged in irregular rows (2 rows proximally increasing to 4 rows distally). Protective membranes on arms low, fleshy, without trabeculae. A single photophore is embedded at the base of each arm I and III. Alive animals colour deep maroon.

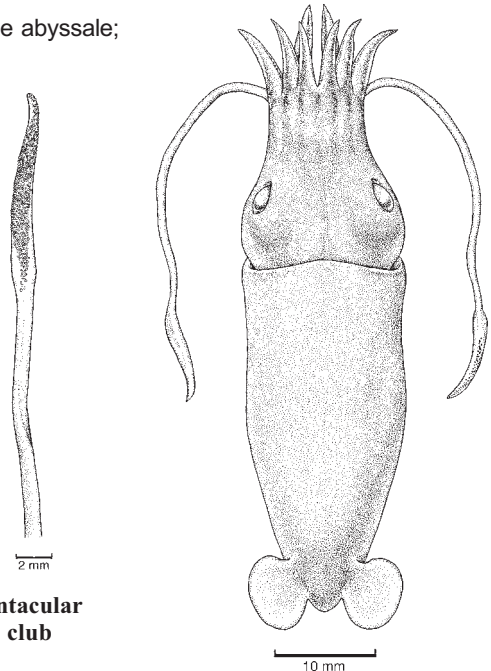
**Similar families occurring in the area**

None.

**Size:** Up to 75 mm mantle length.

**Habitat, biology, and fisheries:** Its biology is poorly known. Oceanic species. Occurring from 100 to 4 200 m, but normally encountered between 700 and 2 000 m. Mantle length at first maturity is about 40 to 50 mm in females and 35 mm in males. Believed to undertake vertical migrations between lesser depths (up to 100 m) at nights and greater depths during the day. The photosensitive vesicles of *Bathyteuthis* appear to function in the detection of bioluminescent light organisms located outside the visual fields. Not of interest to fisheries.

**Distribution:** Although the exact limit boundary is partially unknown, it can be considered a cosmopolitan species, more frequent in the southern Ocean and productive waters of the eastern Pacific, Atlantic and Indian Oceans. Also cited in the Mediterranean Sea and in the Gulf of Mexico.



**dorsal view**

(illustrations: K. Hollis/ABRS)



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**BRACHIOTEUTHIDAE**

**Arm squids**

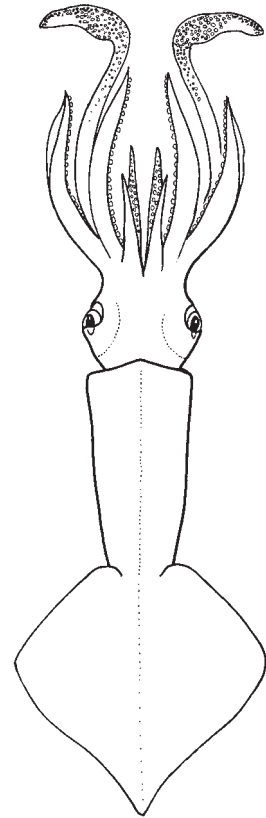
**Diagnostic characters:** The mantle is muscular but generally thin. **Dactylus of tentacular clubs with quadriseriate sucker but the carpal region is greatly expanded and carries numerous small suckers in many series.** Arm suckers biserial. Fins short, terminal, with free anterior lobes. Simple, straight funnel-locking cartilage. Buccal connectives attach to the ventral margins of ventral arms. Light organs known only on eyes, where a single ventral light organ may be present.

**Habitat, biology, and fisheries:** Little is known about the biology of brachioteuthid squids although aggregations near the ocean floor, at depth of about 800 m, have been observed from submersibles. Occurs from the surface to 3 000 m.

**Remarks:** While only 2 genera are presently recognized in this family, many species exist, most of which are not described. The family is in urgent need of revision.

**Similar families occurring in the area**

Ommastrephidae and Loliginidae: Ommastrephidae has T-shaped funnel locking apparatus; in Loliginidae the eye lens is covered by a cornea; neither of those families have numerous series of suckers in the carpal region of the tentacular clubs, a character shared with the Architeuthidae and the Neoteuthidae; in Neoteuthidae, the posterior edges of the fins are convex whereas in architeuthids the digestive gland abuts the cephalic cartilage.




dorsal view

**Key to the *Brachioteuthis* species occurring in the area**

- 1a. Mantle very narrow, widening slightly at anterior opening and tapering abruptly in front of fin; fin length and width about 50% mantle length; fin width to length ratio about 0.9 to 1.1; colour purplish brown . . . . . ***Brachioteuthis picta***
- 1b. Mantle cylindrical, not tapering abruptly in front of fin; fin transversely rhomboidal; fin less than 50% mantle length; fin width to length ratio usually 1.2 to 1.4; colour pale, nearly colourless . . . . . ***Brachioteuthis riisei***

**List of species occurring in the area**

The symbol  is given when species accounts are included.

-  *Brachioteuthis picta* Chun, 1910.
-  *Brachioteuthis riisei* (Steenstrup, 1882).

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***Brachioteuthis picta* Chun, 1910**

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

**FAO names:** **En** – Ornate arm squid; **Fr** – Encornet bras courts orné; **Sp** – Braquiluria moteada.

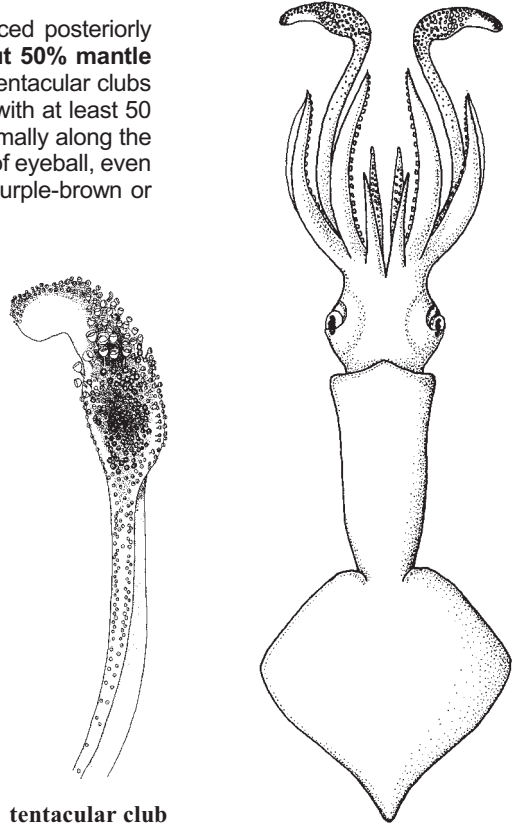
**Diagnostic characters:** Mantle long, slender, produced posteriorly into a tail. Fins sagittate, **fin length and width about 50% mantle length. Fin width to length ratio about 0.9 to 1.1.** Tentacular clubs expanded, parts of the club not clearly differentiated, with at least 50 minute suckers in the carpal region that extends proximally along the club. A single sausage-like light organ on ventral side of eyeball, even in juveniles. Skin of reticular-fibrous structure. Light purple-brown or chocolate.

**Size:** Maximum mantle length 90 mm.

**Habitat, biology, and fisheries:** An oceanic mesopelagic and bathypelagic species. Primarily occurring in depths of 50 to 200 m but its depth range extends from 0 to 952 m, 700 to 952 m by day; the juveniles are epipelagic; 46 to 370 km from shore off Namibia. Males mature at 40 mm mantle length and females at 45 to 50 mm. Spermatophores are transferred to the buccal membrane of the female and spawning is in the water column. Not of interest to fisheries.

**Distribution:** This is a circumglobal, oceanic species, distributed from about 30°N to at least 40°S to 45°S; distribution limits undetermined due to uncertain identifications in the literature. Records of confidence in the waters off Cabinda (Angola), and Namibia.

**Remarks:** Chun (1910) gives the type locality as Valdivia, but this is apparently an error.



tentacular club

dorsal view



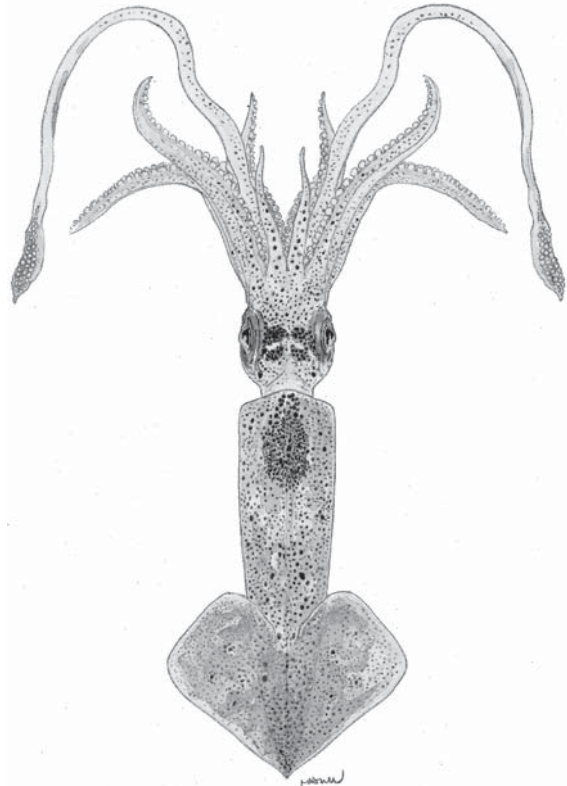
***Brachioteuthis riisei* (Steenstrup, 1882)**

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

**FAO names:** **En** – Common arm squid; **Fr** – Encornet bras courts commun; **Sp** – Braquiluria común.



**tentacular club**  
(from Guerra, 1992)



**dorsal view**

**Diagnostic characters:** Mantle very elongate, muscular. **Fin less than 50% mantle length**, saggitate; **width to length ratio usually 1.2 to 1.4**. Tentacular clubs narrow with very numerous minute suckers in proximal portion. Ocular light organ present in adults.

**Size:** Maximum mantle length 170 mm.

**Habitat, biology, and fisheries:** Epi- mesopelagic species, adults also in bathypelagic habitat. Found from the surface to 3 000 m; about 750 m by day. The spawning season appears to be much extended; hence recently hatched individuals are found throughout the year. Eggs planktonic no forming clusters. Paralarvae have long necks, planktonic and experiencing relatively deep transformations during growth. Found in the stomachs of tuna fish. No interest to fisheries.

**Distribution:** Cosmopolitan. Mediterranean sea; In the Atlantic from southern Norwegian Sea and Iceland to extreme southern Atlantic, not in tropical western Atlantic, nor Gulf of Mexico and Caribbean; Indian Ocean, except Arabian Sea and North Bay of Bengal; central and southern Pacific; circumglobal in southern Ocean.

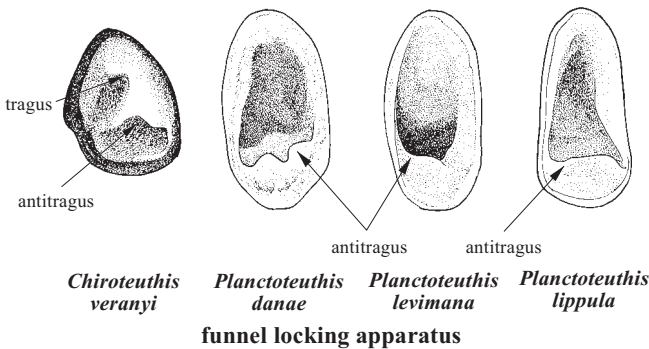
**Remarks:** It seems to be a species complex.



**CHIROTEUTHIDAE**

**Chiroteuthid squids**

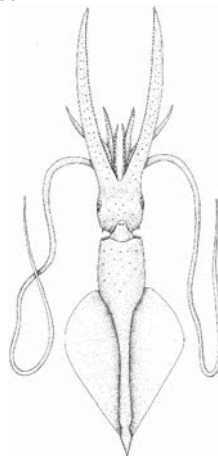
**D** iagnostic characters: Small to medium in size, gelatinous. **Funnel-locking apparatus oval, generally with 1 or 2 knobs (tragus and antitragus) directed toward the centre of the concavity.** Neck elongate. Ventral arms generally elongate. Arm suckers in 2 series. Most species have extremely long, slender tentacles. Tentacle suckers usually in 4 series, but absent in *Grimalditeuthis*. Club very elongate and divided into 2 or 3 portions by symmetrical protective membranes, except in *Planctoteuthis*. **Very distinctive paralarvae, known as the *Doratopsis* stage, with an elongate neck and brachial pillar.** The presence of a *Doratopsis* paralarva is the only character that is unique to the family.



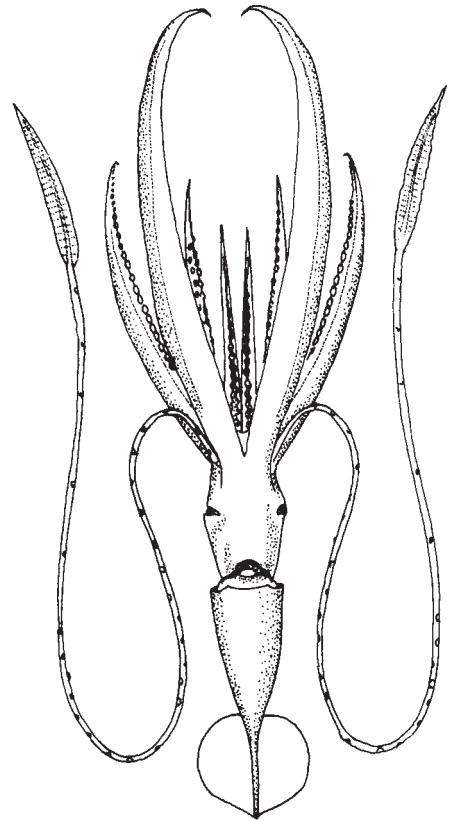
**Habitat, biology, and fisheries:** Our knowledge on the biology of these slow moving, deepsea oceanic squids, usually with elongate necks and slender bodies, is poor. Found from the surface to 2 500 m. Numerous chambers in the arms, head and mantle filled with a light-weight fluid, ammonium chloride, which provides near-neutral buoyancy for the squids. Not of interest to fisheries.

**Similar families occurring in the area**

Mastigoteuthidae: tentacles have very numerous minute suckers in more than 6 series; necks are not elongate.



ventral view  
**Mastigoteuthidae**



**ventral view**


**Key to the species of Chiroteuthidae occurring in the area**






- 1a. Funnel fused to mantle; tentacle clubs lack suckers . . . . . ***Grimalditeuthis bonplandi***
- 1b. Funnel locks to mantle with cartilaginous apparatus; tentacle clubs with suckers . . . . . → **2**
  
- 2a. With a compact club not divided into proximal and distal portions by protective membranes; arms subequal in length in adults (ventral arms much longer in young) . . . . . → ***Planctoteuthis*\***
- 2b. Club very elongate and divided into 2 or 3 portions by protective membranes; ventral arms greatly elongate and thickened . . . . . ***Chiroteuthis veranyi***

**\**Planctoteuthis***. The species of this genus present in the area are compared in the following table (from Young *et al.*, 2008).

Species	Number of suckers arm IV	Arms (I–III) sucker dentition	Antitragus	Fin length	Club shape	Club keel
<i>P. danae</i>	12–13	7–9 distal truncated teeth	Double. Lobes nearly equal	52% ML	Symmetrical	No
<i>P. exophthalmica</i> = <i>P. levimana</i> ?	10	?	?	Width=36% ML	Symmetrical	No
<i>P. lippula</i>	25	>50 minute teeth, distal larger	Single or slight double. Low, broad	40–45% ML	Short, asymmetrical	Yes

**List of species occurring in the area**

The symbol  is given when species accounts are included.

-  *Chiroteuthis veranyi* (Férussac, 1835).
-  *Grimalditeuthis bonplandi* (Vérany, 1839).
-  *Planctoteuthis danae* (Joubin, 1931).
-  *Planctoteuthis exophthalmica* (Chun, 1908).
-  *Planctoteuthis lippula* (Chun, 1908).

**Remarks:** Considerable morphological differences exist among genera of this family. Species of *Planctoteuthis* are usually rather small and very fragile deepsea squids, but, unlike other chiroteuthids, the subadult retains the peculiar doratopsid paralarval tentacular club. Roper and Young (1967) suggested that *Planctoteuthis* is a neotenic *Doratopsis*.



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***Chiroteuthis veranyi* (Férussac, 1835)**

**Frequent synonyms / misidentifications:** *Chiroteuthis lacertosa* Verrill, 1881; *Leptoteuthis diaphana* Verrill, 1884 / None.

**FAO names:** **En** – Verany's long-armed squid; **Fr** – Chirolecalmar de Vérany; **Sp** – Calamarín volador de Verany.

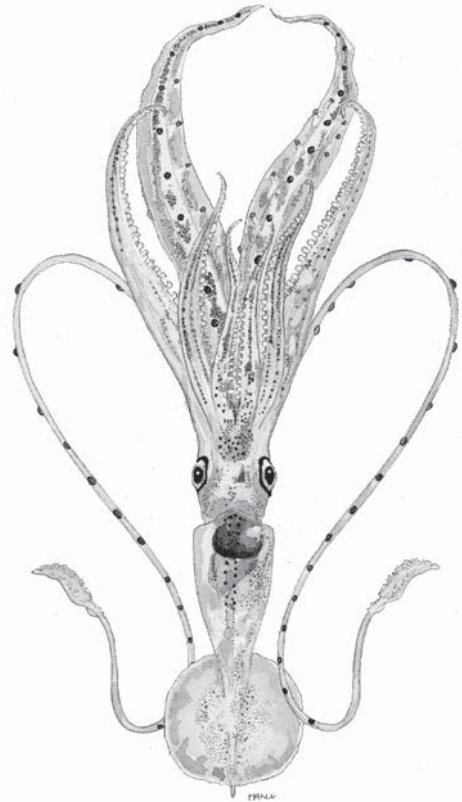
**Diagnostic characters:** Head and arms well developed; mantle relatively small and calyx-like in form; round terminal fins. **Ventral arms (IV) greatly elongate and thickened and with well developed keel; club very elongate and divided into 2 or 3 portions by protective membranes.** Club sucker stalks in 2 distinct parts; stalks of lateral sucker series about twice as long as those of medial sucker series. Eyeball light organs disposed in 2 lateral series or stripes; the intermediate stripe with 3 (2 posterior and large light organs and 1 anterior small); **a pair of round light organs on the ink sac; a row of light organs in the arms IV and on the tentacular stalk.**

**Size:** Mantle length between 100 and 200 mm.



**tentacular club**

(from Guerra, 1992)



**dorsal view**

**Habitat, biology, and fisheries:** Data on the biology of this species are very scarce. Found in the bathyal and in the mesopelagic and upper bathypelagic zones above the continental slope from the surface to depths of 2 130 m by day and 100 to 600 m at night. Known predators are *Dissostichus eleginoides* (Patagonian toothfish), *Prionace glauca* (blue shark), *Thunnus alalunga* (albacore), *Diomedea chrysostoma* (grey-headed albatross), *Diomedea exulans* (wandering albatross), *Diomedea melanophrys* (black-browed albatross), *Globicephala malaena* (pilot whale), *Globicephala melas* (long-finned pilot whale), *Hyperoodon planifrons* (bottlenose whale), *Mirounga leonina* (southern elephant seal), *Stenella coeruleoalba* (striped dolphin) and *Physeter catodon* (sperm whales). Not of interest to fisheries. Depth: 0–2130 m, 100–600 m at night.

**Distribution:** Cosmopolitan, including the Mediterranean Sea. Widely distributed in the Atlantic: from Azores to Namibia; from the Reykjanes Ridge to South Georgia. Indian and Pacific Oceans from Tierra del Fuego to South Africa, Peru and Chile; northeastern Pacific to Oregon.



***Grimalditeuthis bonplandi* (Vérany, 1839)**

**Frequent synonyms / misidentifications:** *Doratopsis sagitta* Chun, 1908 / None.

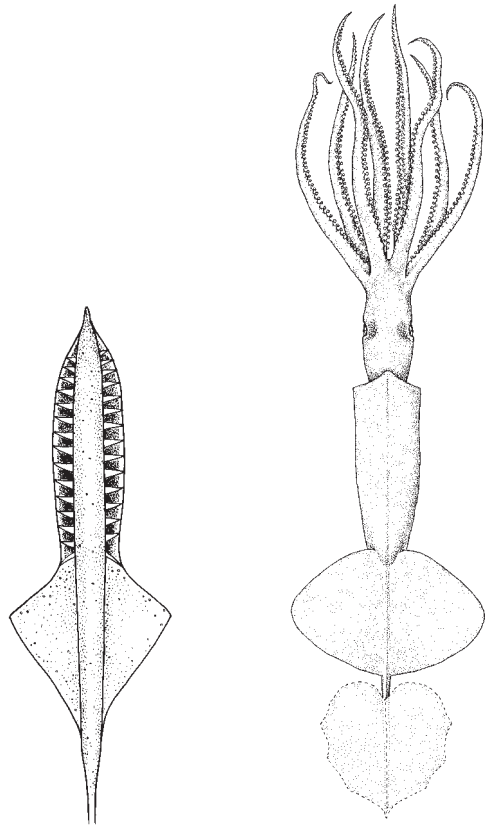
**FAO names:** **En** – Grimaldi's chiroteuthid squids; **Fr** – Chirocalmar de Grimaldi; **Sp** – Quiroluria de Grimaldi.

**Diagnostic characters:** Two fin-like “floatation devices” or secondary fins arise from tail. **Funnel fused to mantle at each funnel-mantle locking apparatus. Arms approximately subequal in length, gelatinous; sucker base with 3 conical papillae.** Tentacles club divided into 2 portions by symmetrical protective membranes. **Suckers absent from clubs.** Funnel valve present. Light organs absent, except at the arm tips of mature females. **A very characteristic pattern of chromatophores on the head:** a line of chromatophores passes across the ventral surface of the head between the anterior ends of eyes; another line runs along the neck from each olfactory papilla anteriorly to each eye, then anterior to each eye along the brachial pillar, terminating at the base of the arms.

**Size:** Maximum mantle length 250 mm.

**Habitat, biology, and fisheries:** This species is infrequently captured but seems to have a worldwide distribution in tropical to temperate seas, inhabiting in the mesopelagic and bathypelagic zones from the surface to 2 500 m by day and 200 to 1 500 m at night. Known predators are *Alepisaurus ferox* (longnose lancetfish) and *Xiphias gladius* (swordfish). Not of interest to fisheries.

**Distribution:** North and South Atlantic; Madeira, Cape Verde Islands to Côte d'Ivoire coast; southwestern Indian Ocean and North Pacific Ocean.



**tentacular club**

(after Young & Roper, 1992)

**dorsal view**

(illustration: K. Hollis/ABRS)



***Planctoteuthis danae* (Joubin, 1931)**

**Frequent synonyms / misidentifications:** *Valbyteuthis danae* Joubin, 1931 / None.

**FAO names:** **En** – Dana's chiroteuthid squid; **Fr** – Chirocalmar de Dana; **Sp** – Quiroluria de Dana.

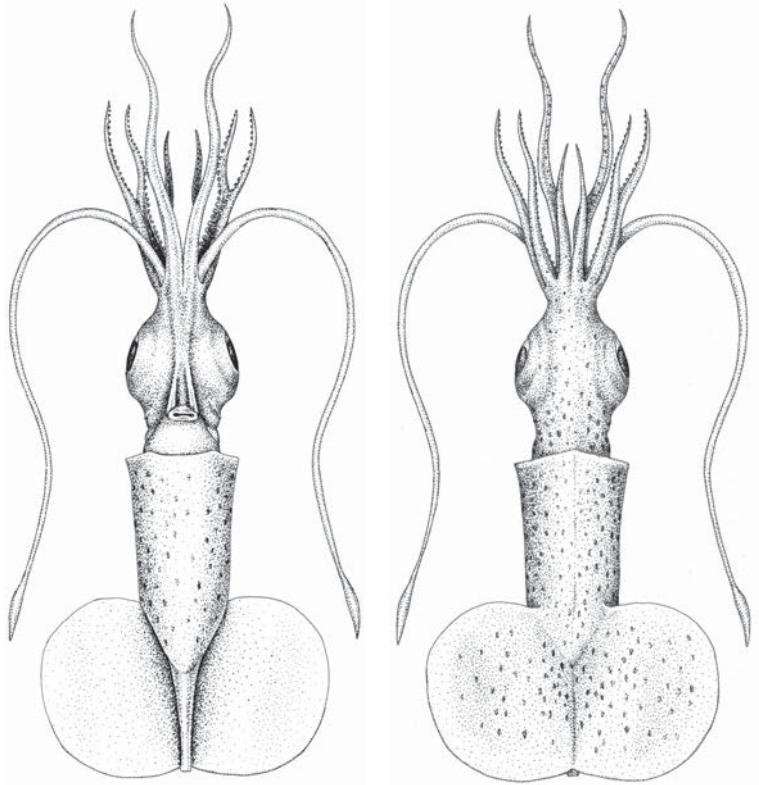
**Diagnostic characters:** Arms subequal in length in adults; arms IV much the longest in young. **Arms IV with relatively few suckers (12 or 13) usually aligned in virtually single series. Arms I–III with 7 to 9 distal truncated teeth.** Tentacular club small, compact, with low protective membranes along both borders, and not divided into proximal and distal regions by protective membranes and with a keel. Head with elongate neck and brachial pillar. Eyes commonly project ventrally from head. Funnel valve absent. **Funnel locking apparatus oval with posterior bump (antitragus) double and with the lobes nearly equal.** Light organs absent.

**Size:** Maximum mantle length 55 mm.

**Habitat, biology, and fisheries:** Occurring at depths of 0 to 2 330 m by day, 50 to 1 250 m at night. Among the deepest living of all pelagic squid, there is a suggestion of ontogenetic vertical spreading but no indication of diel vertical migration. The only known predator is *Alepisaurus ferox* (Lancetfish). Not of interest to fisheries.

**Distribution:** From Madeira to Guinea Bissau in the Atlantic; eastern Pacific from California to Chile; Hawaii and eastern Polynesian Islands.

**Remarks:** The type species, *Planctoteuthis danae*, was originally placed in a new genus, *Valbyteuthis*, within a new family, Valbyteuthidae, by Joubin (1931). Roper and Young (1967) placed *Valbyteuthis* in the family Chiroteuthidae noting the similarity of *Valbyteuthis paralarvae* to those of *Chiroteuthis*. Young (1991) recognized that some paralarvae of *Valbyteuthis* had been previously described by Pfeffer (1912) as members of his new genus, *Planctoteuthis*, within the Chiroteuthidae. *Valbyteuthis*, therefore is a junior synonym of *Planctoteuthis*.



ventral view

dorsal view

(illustrations from Guerra, 1992)



***Planctoteuthis exophthalmica* (Chun, 1908)**

**Frequent synonyms / misidentifications:** *Doratopsis exophthalmica* Chun, 1908; *Chiroteuthis (Planktoteuthis) exophthalmica* (Chun, 1908) / None.

**FAO names:** **En** – Pop-eye chiroteuthid squid; **Fr** – Chirocalmar exorbité; **Sp** – Quiroluria desorbitada.

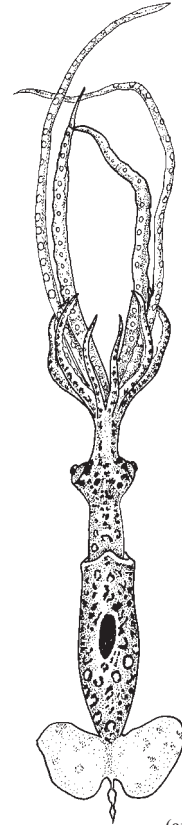
**Diagnostic characters:** Arms subequal in length in adults; arms IV much the longest in young. **Arms IV with few (6 to 10) suckers usually aligned in virtually single series.** Tentacular club small, compact; with low protective membranes along both borders, and not divided into proximal and distal regions by protective membranes. Head with elongate neck and brachial pillar. Eyes commonly project ventrally from head. Funnel valve absent. Funnel locking apparatus oval with posterior bump (antitragus) Light organs absent.

**Size:** Maximum mantle length 25 mm.

**Habitat, biology, and fisheries:** Occurring from the surface to 2 500 m. This species is known only from descriptions of paralarvae. Not of interest to fisheries.

**Distribution:** Eastern Atlantic Ocean, Irish water, Madeira. Indian Ocean.

**Remarks:** *Planctoteuthis exophthalmica* could be a junior synonym of *P. levimana*.



(after Chun, 1910)

**dorsal view**



***Planctoteuthis lippula* (Chun, 1908)**

**Frequent synonyms / misidentifications:** *Doratopsis lippula* Chun, 1908; ?=*Planctoteuthis levimana* (Lonnberg, 1896) / None.

**FAO names:** **En** – Chun's chiroteuthid squid; **Fr** – Chirocalmar de Chun; **Sp** – Quiroluria de Chun.

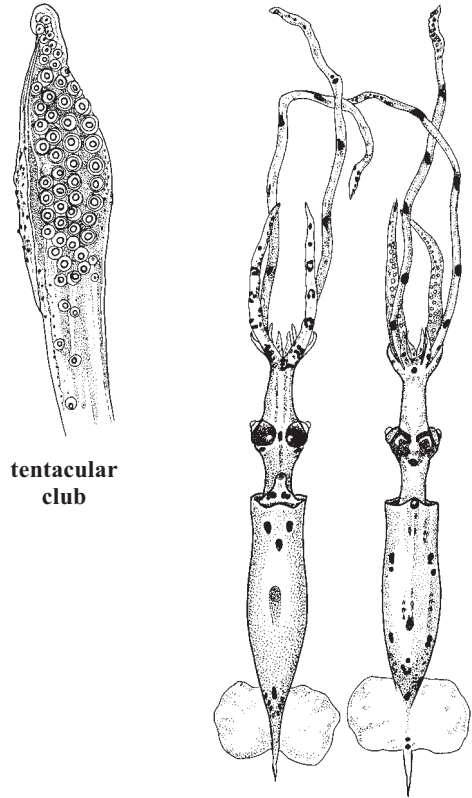
**Diagnostic characters:** Arms subequal in length in adults; **arms IV much the longest in young. Arms IV with 25 suckers usually aligned in virtually single series. Arms (I–III) sucker dentition with more than 50 minute teeth, distal larger.** Tentacular club small, compact; with low protective membranes along both borders, and not divided into proximal and distal regions by protective membranes. Head with elongate neck and brachial pillar. Eyes commonly project ventrally from head. Funnel valve absent. **Funnel-locking apparatus oval with posterior bump (antitragus) single or slight double, low and broad.** Light organs absent.

**Size:** Maximum mantle length estimated, 20 mm.

**Habitat, biology, and fisheries:** This species is known for certain only from the original description, which was based on a 16 mm mantle length specimen and the head of another, from the same haul, estimated to have a mantle length of 20 mm. The only known predator is ?*Delphinus* sp. (common dolphin) (as *Planctoteuthis levimana*, Lonnberg, 1896). Not of interest to fisheries.

**Distribution:** Eastern Atlantic waters: Benguela Current, central Angola, ?north of Azores. Central Pacific (Hawaii).

**Remarks:** Nesis (1987) suggested that *P. lippula* may be a synonym of *P. levimana* (Lonnberg, 1896).



ventral view    dorsal view  
(after Chun, 1910)



**CHTENOPTERYGIDAE**

**Comb-finned squids**

**Diagnostic characters:** Small, muscular. **Fins extend nearly the full length of the mantle in adults; they attach to lateral walls of mantle and are comprised of slender muscle bundles connected by membranes, producing a comb-like appearance.** Funnel-locking cartilages simple, straight. Buccal membrane bears small suckers. Tentacular club suckers in 8 to 20 series. Mature females with an accessory nidamental gland. **Males without hectocotylus.**

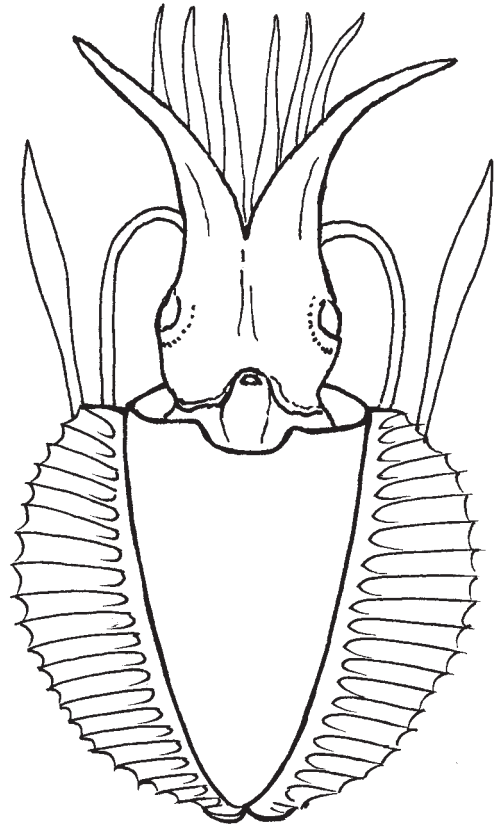
**Habitat, biology, and fisheries:** Very scarce data. No interest to fisheries. Occurring from the surface to 3 000 m; most abundant at depths from 500 to 1 000 m during the day and migrating into near-surface waters at night.

**Similar families occurring in the area**

None, no other family has comb-like muscle bundles in fins.

**Key to the species of Chtenopterygidae occurring in the area**

- 1a. Light organ on eyes and large oval light organ on viscera . . . . . *Chtenopteryx sicula*
- 1b. No light organ on neither eyes nor viscera . . *Chtenopteryx canariensis*



ventral view

**Remarks:** This family, monotypic, is in need of revision, and a number of undescribed species are included in the only recognized genus. The type species, *Chtenopteryx sicula*, was described by Naef as “without visceral photophore”; however, recent observations on specimens from the Mediterranean Sea reported the presence of a visceral photophore (Young and Vecchione, ToL); therefore, a clarification of the species status in the Mediterranean Sea is necessary before the situation of the species in the other oceans can be resolved. Along with *Chtenopteryx sicula* 2 other species are generally recognized at present: *C. sepioloides* Rancurel, 1970 from the Pacific Ocean and *C. canariensis* Salcedo-Vargas and Guerrero-Kommritz, 2000, from the Canary Islands. Both are listed here, pending taxonomic revision. The genus name was formerly spelled *Ctenopteryx*; however, the actual correct spelling is Appellof’s original, “*Chtenopteryx*”.

**List of species occurring in the area**

The symbol ♪ is given when species accounts are included.

♪ *Chtenopteryx canariensis* Salcedo-Vargas and Guerrero-Kommritz, 2000.

♪ *Chtenopteryx sicula* (Vérany, 1851).

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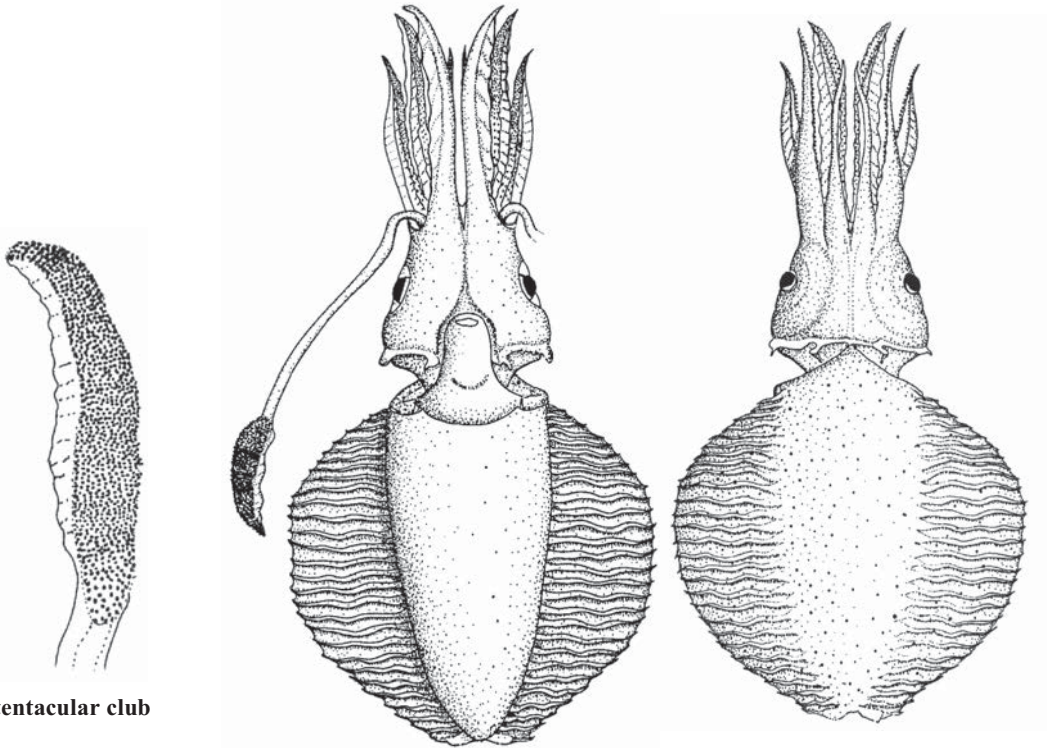
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***Ctenopteryx canariensis*** Salcedo-Vargas and Guerrero-Kommritz, 2000

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

**FAO names:** **En** – Canaries comb-finned squid; **Fr** – Calmar pectiné des Canaries; **Sp** – Calamar pectinado canario.



tentacular club

(after Salcedo-Vargas & Guerrero-Kommritz, 2000)

ventral view

dorsal view

**Diagnostic characters:** Suckers arranged up to 14 longitudinal rows in arms and 16 to 20 in tentacular club. Absence of ink sac light organs.

**Size:** Maximum mantle length 65 mm, mature male.

**Habitat, biology, and fisheries:** Biology unknown. Of no interest to fisheries. Found at 1 000 m depth.

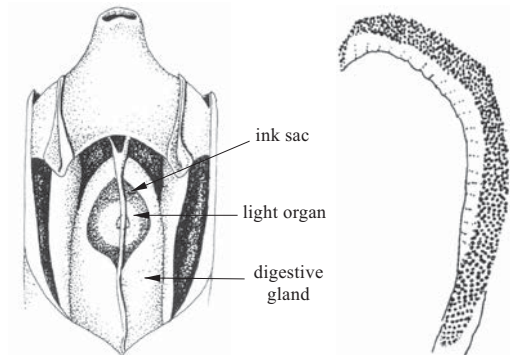
**Distribution:** Tropical eastern central Atlantic from Canary Islands to the Equator.



***Chtenopteryx sicula* (Vérany, 1851)**

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

**FAO names:** **En** – Sicilian comb-finned squid; **Fr** – Calmar pectiné sicilienne; **Sp** – Calamarín pectinado siciliano.

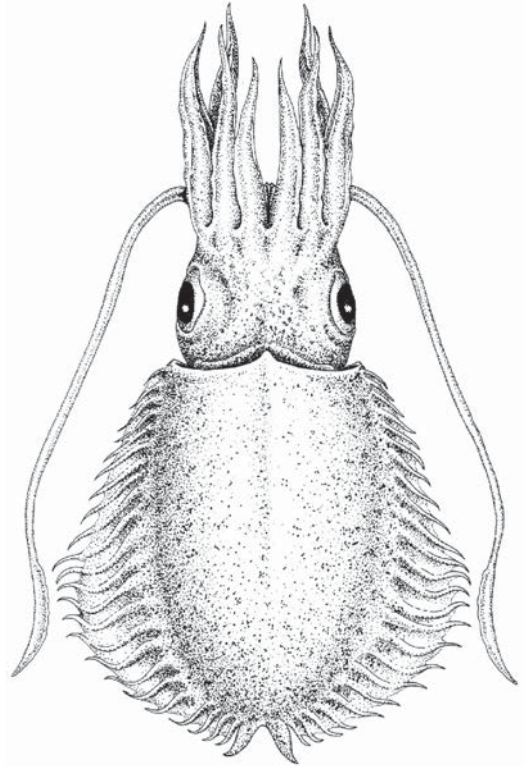


**internal organ**

(from Guerra, 1992)

**tentacular club**

(from Saledo-Vargas & Guerrero-Kommritz, 2000)



**dorsal view**

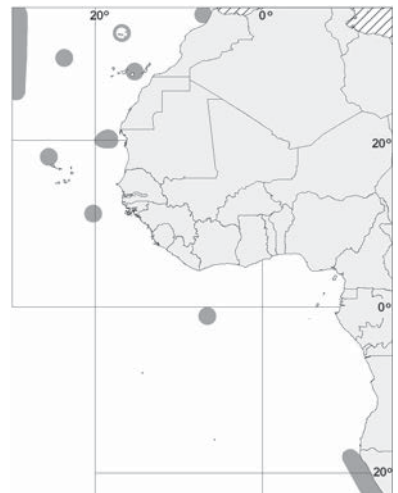
(from Guerra, 1992)

**Diagnostic characters:** Large oval light organ on viscera. Suckers on arms I–III biserial proximally, in 4 to 6 series distally. Tentacular club with 8 to 14 series of small suckers.

**Size:** Maximum mantle length 115 mm.

**Habitat, biology, and fisheries:** Larvae and juveniles in epipelagic and mesopelagic, adults mainly in bathypelagic zones. Found at depths of 0 to 3 000 m, 20 to 925 m by day, 25 to 990 m at night. Known predators include *Beryx spendens* (splendid alfonso), *Chauliodus* (viperfish), *Synaphobranchus*, (deep-sea eel), *Thunnus alalunga* (albacore), *Xiphias gladius* (swordfish) and a Mediterranean dolphin. Males mature at 35 to 40 mm mantle length, females at about 40 mm mantle length. Not of interest to fisheries.

**Distribution:** Tropical-subtropical cosmopolitan: Mediterranean Sea; eastern Atlantic from Bay of Biscay to South Africa (36°S); western Atlantic from Nova Scotia to Suriname. Indian and Pacific Oceans.

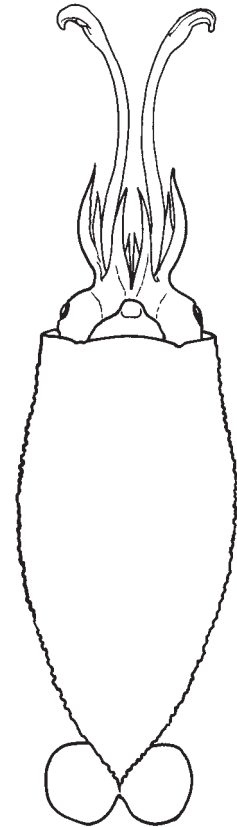


**CRANCHIIDAE**

**Cranch squids**

**Diagnostic characters:** From small (*Helicocranchia* has a maximum mantle length of 100 mm) to very large squids (*Mesonychoteuthis* maximum mantle length is well over 200 cm). In general appearance they often appear to have bloated bodies and short arms. The mantle is generally thin but muscular. **Head fused to mantle at funnel and nuchal locking apparatuses.** With coelom (internal cavity) modified into a large buoyancy chamber. Armature of suckers or hooks in 2 series. Buccal connectives attach to ventral borders of arms IV. Digestive gland generally spindle-shaped and situated well posterior to cephalic cartilage. Most paralarvae with eyes on stalks.

**Habitat, biology, and fisheries:** Cranch squids occur from the surface to approximately 2 000 m. The biology of the majority of the species of this family is poorly known. They possess a large buoyancy chamber and, hence, the common name 'bathyscaphoid squids'. They seem to be terminal spawners. Several species have been observed in deep water from submersibles to exhibit a peculiar posture (cockatoo posture) with the arms and tentacles folded back over the head. Many species go through marked morphological change with growth and at maturity. These can involve changing eye shape and position, changing fin shape, increased pigmentation and development of light organs on arm tips, various modifications of arm structure and, apparently, loss of tentacles. These changes have led to many developmental stages being named as separate species or genera. Cranchiid paralarvae, which are easily recognized by their long eyestalks, are common in near-surface waters and many remain in this habitat until reaching a rather large size (about 50 to 100 mm ML). Most species occupy progressively deeper waters as they grow larger (ontogenetic descent). Not of interest to fisheries.



ventral view

**Similar families occurring in the area**

None.

**Key to the subfamilies and genera of adult Cranchiidae occurring in the area** (from N.A. Voss, 1980)


- 1a. Ventral surface of mantle with 1 or 2 cartilaginous strips extending posteriorly from anterior apex of funnel-mantle fusions; funnel fused to head laterally; eyes with 4 or more small, round to oval photophores . . . . . **Subfamily Cranchiinae**
- 1b. Ventral surface of mantle without cartilaginous strips extending posteriorly from anterior apex of funnel-mantle fusions; funnel free from head laterally; eyes with 1 usually large photophore, or 2 or 3 markedly dissimilar-sized photophores with the largest usually crescent-shaped . . . . . **Subfamily Taoninae**
- 2a. Ventral surface of mantle with 2 cartilaginous strips in inverted V-shaped pattern extending posteriorly from anterior apex of funnel-mantle fusions; funnel valve present; dorsal pad of funnel organ with 3 longitudinal, triangular flaps; gladius with short conus . . . . . → 3
- 2b. Ventral surface of mantle with 1 cartilaginous strip extending posteriorly from anterior apex of funnel-mantle fusions; funnel valve absent; dorsal pad of funnel organ with 3 to 7 narrow papillae; gladius with long slender conus . . . . . **Leachia**













- 3a.** Mantle covered with cartilaginous tubercles; eyes with 14 photophores; brachial photophores present on all arms in near mature and mature females; suckers in 4 series in midportion of hectocotylized right IV in males . . . . . ***Cranchia***
- 3b.** Mantle without cartilaginous tubercles except on ventral cartilaginous strips and sometimes on dorsal median line; eyes with 4 or 14 photophores; brachial photophores present only on arms III in near-mature and mature females; suckers in 2 series on midportion of hectocotylized right or left IV in males . . . . . ***Liochanchia***
- 4a.** Fins small, paddle-shaped, subterminal; eyes with 1, usually large, photophore . . . . . → **5**
- 4b.** Fins not paddle-shaped, may be short to long, round to lanceola-shaped, terminal or terminal lateral; eyes with 1 large and 1 or 2 small photophores . . . . . → **6**
- 5a.** Fins fused distally, inset on short rostrum of gladius which projects dorsally free of end of mantle; eyes small to medium . . . . . ***Helicocranchia***
- 5b.** Fins widely separated, insert on lateral expanded ends of transverse extensions of posterior end of gladius; eyes proportionally large to huge . . . . . ***Bathothauma***
- 6a.** Gladial conus short, broad to narrow; fins short (<25% mantle length), oval to round; digestive gland long, narrow, spindle-shaped . . . . . → **7**
- 6b.** Gladial conus medium to long, narrow, or needle-like to filiform; fins medium to long (30 to 60% mantle length), narrow, lanceolate to ovate; digestive gland stout, spindle-shaped or rounded. . . . . → **8**
- 7a.** Posterior fin insertions do not extend to tip of gladius; no tubercles present on funnel-mantle fusion cartilages; dorsal pad of funnel organ with large, triangular lobe on each lateral arm; eyes with small, round, anterior photophore indented into median anterior margin of large, round, posterior photophore . . . . . ***Sandalops***
- 7b.** Posterior fin insertions extend to tip of gladius; 2 small tubercles present at anterior end of funnel-mantle fusion cartilages; dorsal pad of funnel organ with large, spatulate papilla on each lateral arm; eyes with small, crescent-shaped, anterior photophore lying closely within concavity of large, crescent-shaped, posterior photophore . . . . . ***Liguriella***
- 8a.** Anterior fin insertions on lateral margins of lanceola of gladius . . . . . → **9**
- 8b.** Anterior fin insertions on lateral margins of mantle . . . . . → **11**
- 9a.** Tentacular club with hooded hooks, marginal suckers of manus greatly reduced in size or lost; arms IV the longest in juveniles, approximately coequal to III in adults; gladial conus narrow or needle-like . . . . . → **10**
- 9b.** Tentacular club without hooded hooks (enlarged suckers with 1 or 2 large, central, hook-like teeth on distal margin), marginal suckers of manus not greatly reduced in size or lost; arms III the longest in juveniles, the longest or approximately coequal to II in adults; gladial conus filiform . . . . . ***Taonius***
- 10a.** Arms without hooded hooks; fins lanceolate becoming attenuate posteriorly. . . . . ***Galiteuthis***
- 10b.** Arms with hooded hoks on midportion; fins stout, ovate (nearly round in combined outline in juvenile), do not become attenuate posteriorly . . . . . ***Mesonychoteuthis*<sup>1/</sup>**

<sup>1/</sup> This genus has no species represented in the area

- 11a.** Funnel valve present; dorsal pad of funnel organ with triangular flap on each lateral arm; eyes with 2 photophores (large, roughly crescent-shaped posterior photophore, and within its concavity, smaller, roughly elongate S-shaped anterior photophore); carpal suckers in 2 series on tentacular stalk . . . . . → **12**
- 11b.** Funnel valve absent; dorsal pad of funnel organ with long, spatulate papilla on each lateral arm; eyes with 3 photophores (large, crescent-shaped posterior photophore, and within its concavity, a smaller, crescent-shaped anterior photophore and a third small, oval photophore); carpal suckers in 4 series set in zigzag pattern on tentacular stalk . . . . . **Teuthowenia**
- 12a.** Photophores absent on ventral surface of stout, spindle-shaped, digestive gland; long, single united digestive duct . . . . . **Egea**
- 12b.** Large compound photophore present on ventral surface of rounded digestive gland; 2 short digestive ducts remain separate . . . . . **Megalocranchia**

### List of species occurring in the area

The symbol  is given when species accounts are included.

-  *Bathothauma lyromma* Chun, 1906.
-  *Cranchia scabra* Leach, 1817.
-  *Egea inermis* Joubin, 1933.
-  *Galiteuthis armata* Joubin, 1898.
-  *Helicocranchia papillata* (Voss, 1960).
-  *Helicocranchia pfefferi* Massy, 1907.
-  *Leachia atlantica* (Degner, 1925).
-  *Liguriella podophtalma* Issel, 1908.
-  *Liocranchia reinhardtii* (Steenstrup, 1856).
-  *Megalocranchia oceanica* (Voss, 1960).
-  *Sandalops melancholicus* Chun, 1906.
-  *Taonius pavo* (Lesueur, 1821).
-  *Teuthowenia maculata* (Leach, 1817).

**Remarks:** This is one of the most speciose Oegopsid families, and still there are many undescribed species.

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***Bathothauma lyromma* Chun, 1906**

**Frequent synonyms / misidentifications:** *Leucocranchia pfefferi* Joubin, 1912 / None.

**FAO names:** **En** – Lyre cranch squid; **Fr** – Encornet-outré lyre; **Sp** – Cranquiluria cítara.

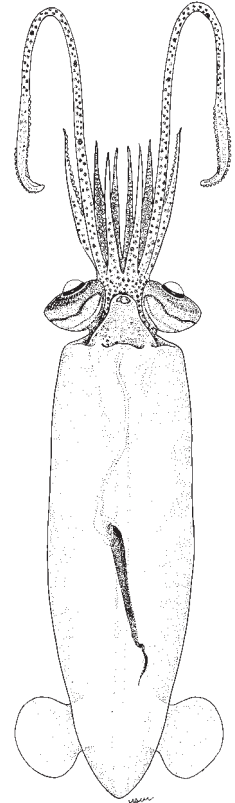
**Diagnostic characters:** Mantle cylindrical, translucent and widely rounded posteriorly. Fins small, subterminal and paddle-shaped directly attached to the mantle ahead of its posterior end and fairly separated from one other. Eyes large, subspherical and prominent with a semilunar light organ on ventral side of each eyeball; sessile in adults, but with extremely long eye stalks and long slender muzzle in paralarvae. Funnel wide, large and it extends almost to the proximal part of the arms; **funnel valve absent**. The tips of dorsal arms in adult males become thinner, accompanied by a change from 2 rows of arm suckers to 4 rows of much smaller suckers with much reduced aperture. The percentage of the arm that is modified increases with increasing mantle length; in most males it is 64%. Tentacles long and muscular with 4 rows of carpal suckers; manus with 4 rows of suckers and protective membrane with trabeculae on both sides; dactylus with 4 rows of small suckers; swimming keel present.

**Size:** Up to 200 mm mantle length.

**Habitat, biology, and fisheries:** A meso-bathypelagic species occurring from 100 to about 2 000 m. It does not seem to undertake vertical migrations. The eye stalks disappear at a mantle length of about 110 mm. Sexual differentiation becomes apparent at a mantle length of approximately 60 mm. First arms of males are modified at a mantle length of about 60 mm. The smaller specimens lives in shallower waters than the larger ones. Of no interest to fisheries.

**Distribution:** Tropical and subtropical cosmopolitan species up to the sub-Antarctic region.

**Remarks:** Recent studies indicate that at least 4 closely related species exist.



female  
ventral view



***Cranchia scabra* Leach, 1817**

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

**FAO names:** En – Rough cranch squid; Fr – Encornet-outré rude; Sp – Cranquiluria ruda.

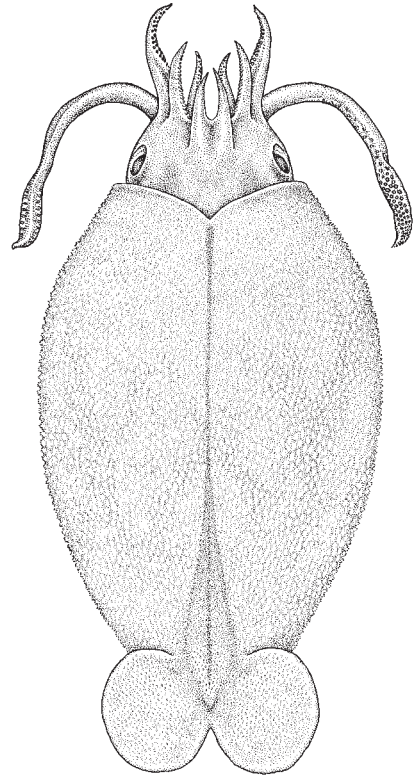
**Diagnostic characters:** Stout, spindle-shaped mantle tapers posteriorly to broad point. Mantle walls thin. **Entire surface of mantle and dorsal surface of fins is beset by cartilaginous tubercles; whose tops bear 3 to 5 sharp spines.** Head with large, round sessile eyes. Fins small, round, resembling symbol of infinity. **A total of 14 light organs on eyeball:** 6 around the pupil, 7 arched along ventral side of eyeball and 1 between them. Funnel large and broad, extending nearly to base of arms. Funnel valve present. Arms short to medium length, narrow, muscular. A large light organ on ends of all arms in adult females. Right ventral arm hectocotylized with 4 rows of suckers in its medial part. Tentacles with slightly expanded clubs, diagonally set pairs of carpal suckers alternate with pads on distal two-thirds of stalk; carpal group present; suckers of club largest on midmanus, with central suckers only slightly larger than marginals; suckers abruptly reduced in size on dactylus.

**Size:** Mantle length up to 150 mm.

**Habitat, biology, and fisheries:** A meso to bathypelagic species. Found from the surface to 2 000 m. This species is among the fast growing squids in the epipelagic waters of the tropical Atlantic. Juveniles present in upper 400 m day and night. There is a tendency for larger juveniles to extend range into deeper water. Adults have been taken in open nets at depths of 1 900 to 2 000 m. The maximum estimated age from the statoliths of animals ranging from 50 to 15 mm mantle length was 170 days. The hatching period in the central-east Atlantic goes from April to June, with a clear peak in May. This species seem to spawn at great depths and it is likely that just after hatching, small paralarvae ascend to epipelagic waters, which was confirmed by captures of paralarvae of 3.3 mm mantle length in the superficial water layer of the open tropical Atlantic. During the first 4 to 5 months of their ontogenesis feed and grow quickly in the epipelagic waters, attain 120 to 130 mm mantle length and then move onto deeper water for maturation and subsequent spawning.

**Distribution:** Tropical and subtropical cosmopolitan species. Distribution generally described by north and south subtropical convergences.

**Remarks:** May comprise more than 1 species or subspecies.



**dorsal view**

(illustration: K. Hollis/ABRS)





***Egea inermis*** Joubin, 1933

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

**FAO names:** **En** – Unarmed cranch squid; **Fr** – Encornet-outré désarmé; **Sp** – Cranquiluria desarmada.

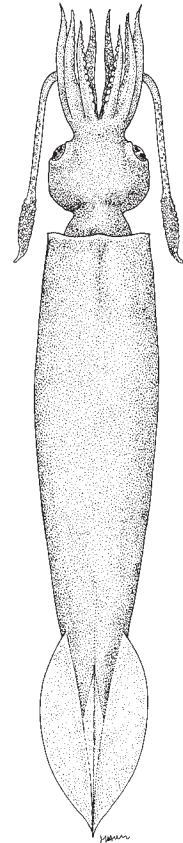
**Diagnostic characters:** **Mantle fused with head and funnel in the nuchal region.** The mantle is long, narrow, spindle-shape, tapering posteriorly to attenuated tip, and **without hyalines stripes on its ventral side.** In young (7 to 16 mm ML) the funnel-mantle fusion cartilages are elongate and roughly triangular; the fins are small and paddle-shape, inserted on an elongate, diamond-shaped lanceola. In juveniles (> or = 20 mm ML) the head has a short, stout, arm-crown stalk; eyes oval, with short ventral rostrum, on short to medium length stalks. Tentacles long, narrow, with 2 rows of carpal suckers changing to 4 rows about 1 club length proximal to forming club.

**Size:** Maximum mantle length of subadults 420 mm approximately (mature animals are not available).

**Habitat, biology, and fisheries:** Epi- mesopelagic species; occurring from the surface to 2 000 m. The paralarvae between 7 and about 35 mm mantle length concentrated day and night in upper 200 m; following morphological changes (at approximately 35 to 40 mm ML), juveniles expand their range to at least 800 m. Night captures of juveniles and large subadults from subsurface to about 300 m indicate that at least part of the population undergoes diel vertical migrations. Maturation occurs in deep water possible 2 000 m. None interest to fisheries.

**Distribution:** Circumglobal in tropical and equatorial waters, extending in Gulf of Mexico and northwestern Atlantic in Gulf Stream system, and into northwestern Pacific in Kuroshio Current.

**Remarks:** It seems to comprise at least 2 species.



dorsal view



***Galiteuthis armata*** Joubin, 1898

**Frequent synonyms / misidentifications:** *Taonidium pfefferi* Russell, 1909; *Galiteuthis shumi* Chun, 1910 / None.

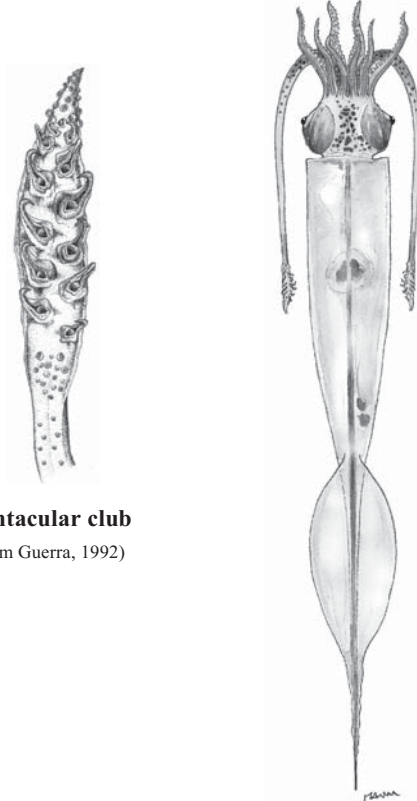
**FAO names:** **En** – Armed helmet squid; **Fr** – Encornet-outré armé; **Sp** – Cranquiluria armada.

**Diagnostic characters:** Mantle long, lanceolated, fused with funnel and head in the occipital area. Mantle surface smooth. A total of 2 to 4 small conical tubercles on the mantle-funnel fusion sites (difficult to see in adults, but easily felt by touch). No tubercles on dorsal side of mantle near the mantle-head fusion. **Fins lanceolated reaching the pointed tail of the mantle.** Eyes large, rounded and protuberant, even in adults, but at this stage they are not pedunculated. Two light organs in the ventral side of the eyes. Anterior eye light organ narrow, rod-like. Arms short, suckers in 2 rows with smooth chitinous rings. **Tentacles about 50% of mantle length with 2 rows of carpal suckers set in pairs on distal two-thirds to three-quarters of stalk; manus with well-developed protective membranes and with a total of 6 pairs of suckers modified with growth into hooks.** Few small chromatophores in the mantle, being more frequent in the dorsal part of the fins.

**Size:** Up to 610 mm mantle length.

**Habitat, biology, and fisheries:** A bathypelagic species. Occurs in depths of 100 to about 4 000 m but more often at 500 to 2 000 m. Juneniles in epipelagic and mesopelagic waters. Frequently preyed by tunas, dolphins and sperm whales. No interest for fisheries.

**Distribution:** Western Mediterranean and Adriatic Sea. In the eastern Atlantic from about 50°N to South Africa and in the western Atlantic from Newfoundland up to Bermuda.



**tentacular club**  
(from Guerra, 1992)

**dorsal view**



***Helicocranchia papillata* (Voss, 1960)**

**Frequent synonyms / misidentifications:** *Ascocranchia joubini* Voss, 1962 / None.

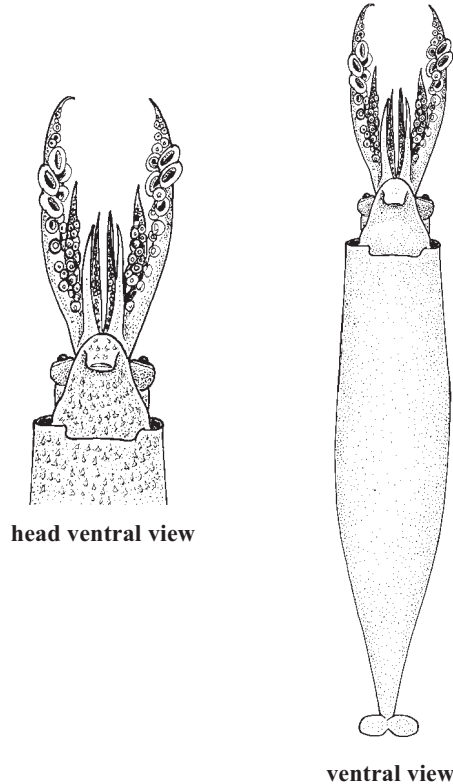
**FAO names:** **En** – Siphonate cranch squid; **Fr** – Encornet-outré à grand siphon; **Sp** – Cranquiluria sifonada.

**Diagnostic characters:** Mantle cylindrical, stoutest in midportion, tapering posteriorly to a blunt point. **Mantle thick, coriaceous, muscular.** Surface of mantle (particularly in anterior part) and funnel beset by numerous small, sharp cuticular papillae. **Funnel-mantle fusion area broad with barely discernable narrow cartilage, tubercles absent;** middorsal anterior mantle margin free with medial cleft; nuchal fusion cartilage irregular oval-shaped, tubercles absent. Fins tongue-like, of subequal width at the base and in the middle, set on lanceola of gladius, posterior edges of both fins fused. **Funnel very large, broad, extending beyond base of IV arms.** Head with small to medium size oval to round eyes; eye with single small to large, often poorly defined, oval to triangular light organ on posteroventral surface. Suckers in midpart of III arms in females considerably larger than on other arms, with smooth rings. Sucker rings of other arms with small denticles. Colour reddish brown.

**Size:** To 60 mm mantle length.

**Habitat, biology, and fisheries:** Meso and bathypelagic squids. Found from the surface to 2 000 m or more. None interest to fisheries.

**Distribution:** Western, central and eastern subtropical North Atlantic Ocean; Caribbean Sea and Gulf of Mexico, northeastern African waters.



(illustrations after Nesis, 1987)



***Helicocranchia pfefferi* Massy, 1907**

**Frequent synonyms / misidentifications:** *Helicocranchia beebei*, Nesis (1982, 1987) / None.

**FAO names:** **En** – Pfeffer's cranch squid;  
**Fr** – Encornet-oultre de Pfeffer; **Sp** – Cranquiluria de Pfeffer.

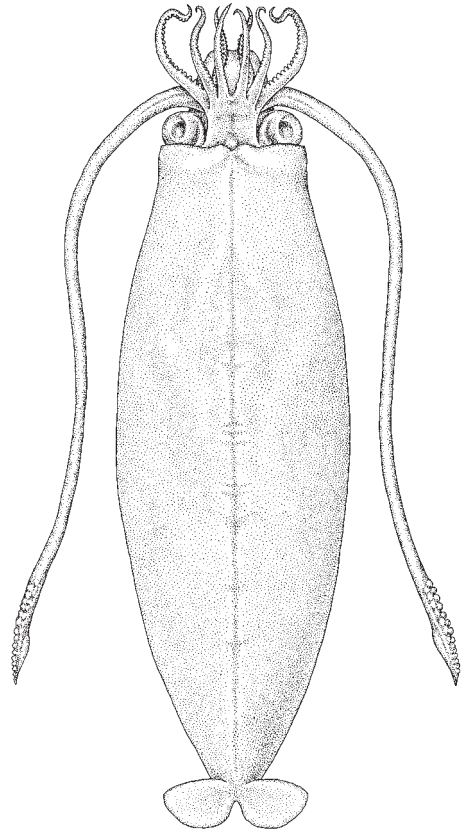
**Diagnostic characters:** **Absence of cartilaginous papillae on the mantle, no enlarged suckers on the arms III of adult females (or on tentacular clubs); tentacular clubs with suckers only.** Tentacular stalks with 2 series of suckers and pads nearly to stalk base. Funnel extremely large. Funnel valve absent. **L-shaped ventral pads on funnel organ.** Fins paddle-shaped. Fins insert on short rostrum of gladius which projects dorsally in advance of mantle apex. Presence of bands of orange/brown chromatophores on sides of mantle; moderately long, robust tentacles, less than 100% of the mantle length.

**Size:** Maximum mantle length from 90 to 100 mm.

**Habitat, biology, and fisheries:** Paralarvae and juveniles occur in the epipelagic zone, then descend gradually to the upper mesopelagic; finally, adults descend into the lower mesopelagic and the bathypelagic zones to at least 2 000 m. Some diel vertical migration might occur. No interest to fisheries.

**Distribution:** Species occur throughout the world's tropical and subtropical oceans and, in the Atlantic Ocean, in north temperate waters. In the Atlantic it occurs from 50° to 55°N to 30° to 35°S. Complete distributional pattern as yet undetermined.

**Remarks:** *Helicocranchia pfefferi* probably is a complex species.



**dorsal view**

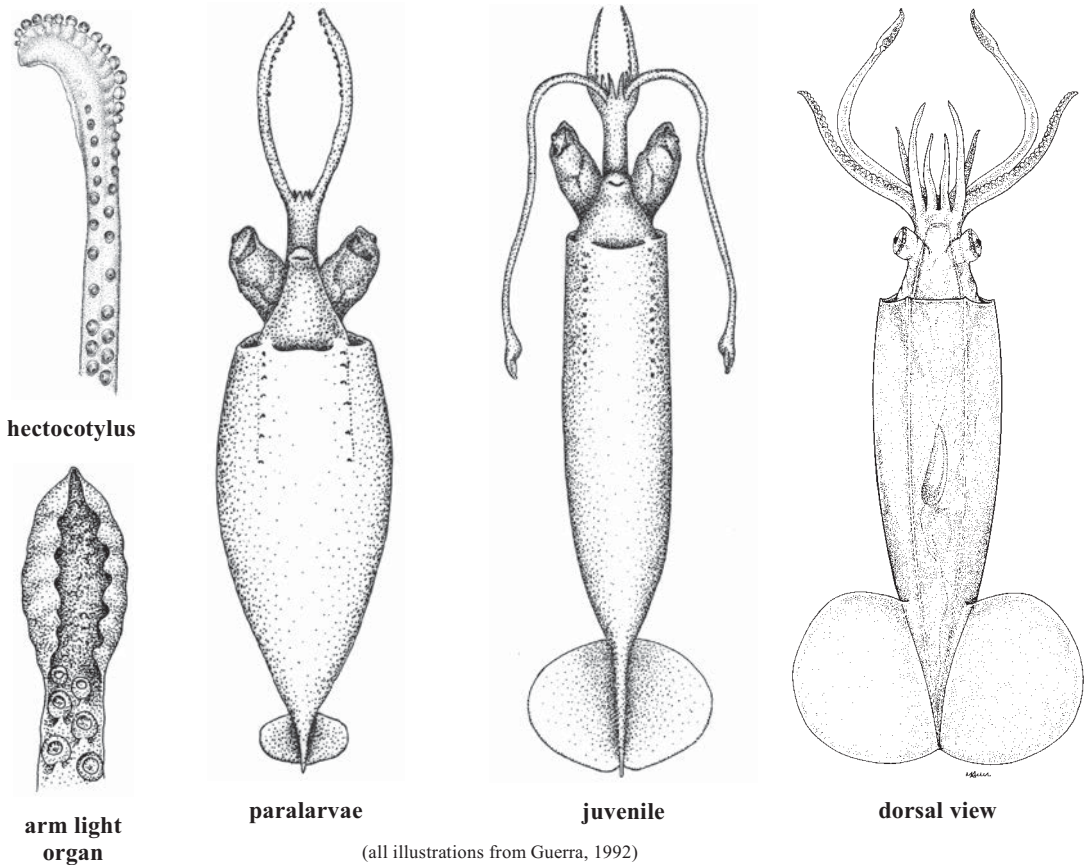
(illustration: K. Hollis/ABRS)



***Leachia atlantica*** (Degner, 1925)

**Frequent synonyms / misidentifications:** *Pyrgopsis rynchophorus* Rochebrune, 1884 / None.

**FAO names:** **En** – Atlantic cranch squid; **Fr** – Encornet-outré de l'Atlantique; **Sp** – Cranquiluria atlántica.



**Diagnostic characters:** Mantle fused with head and funnel in the nuchal region. Mantle elongated, cylindrical or narrowly fusiform. **Two hyalines stripes present on ventral side of mantle starting from the sites of mantle-funnel fusion**, its length extending from 14% mantle length, and bearing cartilaginous tubercles with one of several acute tops. The number of round ocular photophores ranging from 5 to 21, arranged in outer and inner arcs around the pupil. Fins round to transversely elliptical in combined outline; fin length 20 to 30% mantle length. Funnel valve absent. **A large light organ (brachial end-organ) present on the ends of III pair of arms in near-mature or mature females; right IV arm modified into hectocotylus, elongate, curved laterally with distal one-third to one-half modified by enlarged**, reduced-aperture suckers in ventral row on flared ventral margin, suckers in dorsal row reduced and may be lost distally. Eyes in paralarvae and juveniles are stalked at a mantle length up to 50 to 100 mm.

**Size:** Maximum mantle length (ML) to 100 mm.

**Habitat, biology, and fisheries:** A meso-bathypelagic species. Occurs from the surface to about 2 000 m. It undergoes relatively important changes during growth. Life history of this species includes early growth in shallow water and ontogenetic descent to deep waters when maturation occurs. There is evidence of diel movements. Spawning seems to occur in surface waters, where numerous mature and spent females were caught at night and early morning. None interest to fisheries.

**Distribution:** North Atlantic Subtropical Region, northward reaches Newfoundland Bank and the Bay of Biscay and southward Senegalese waters, although its southern limit is not well known; Gulf of Mexico, Strait of Florida and northern Caribbean.

**Remarks:** Of the 14 nominal species in the genus *Leachia*, at least 6 species are valid, 1 yet to be named. The closely related species show contiguous geographical distributions with considerable overlap. While the genus is easily characterized, the species are not easily recognized, because of incomplete descriptions based principally on paralarvae (Young and Mangold, 2007). Therefore, additional material and observations are deeply needed to help define the situation. Paralarvae of *Leachia* were originally placed in the genus *Pyrgopsis* and are now often referred to as pygopsis paralarvae (Young and Mangold, 2007).



***Liguriella podophthalma* Issel, 1908**

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

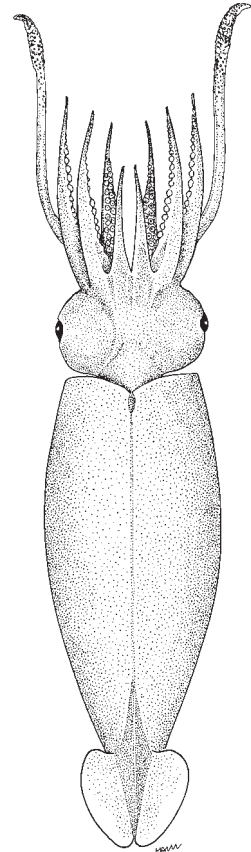
**FAO names:** **En** – Bigeye cranch squid; **Fr** – Encornet-outré grand-oeil; **Sp** – Cranquiluria ojo-grande.

**Diagnostic characters:** Mantle without tubercles, but with tubercles at funnel mantle fusion, which have 2 small cartilaginous tubercles at anterior end; funnel valve absent; **dorsal pad of funnel organ with 3 spatulate papillae; fins terminal, small, posterior fin insertions extend to tip of gladius and fuse along distal end of vane of gladius; eyes with 2 contiguous photophores**, the anterior 1 small, crescent-shaped lies closely within the concavity of the large crescent-shaped posterior photophore; **arm tip photophores absent**; tentacular club with suckers, no hooks, no carpal cluster, 2 series of suckers and knobs along tentacular stalk.

**Size:** Maximum mantle length known 243 mm.

**Habitat, biology, and fisheries:** The species overall vertical distribution extends from subsurface waters to depths in excess of 1 000 to 1 500 m. Paralarvae and juveniles up to about 40 mm mantle length occur from subsurface depths to around 400 m, while older animals extend progressively deeper with growth. This ontogenetic descent extends to about 1 500 m where the largest specimen caught to date was a 243 mm mantle length subadult. Not interest to fisheries.

**Distribution:** This species occurs circumglobally in tropical, subtropical and northern sub-Antarctic waters of the world's oceans.



**dorsal view**



***Liocranchia reinhardtii*** (Steenstrup, 1856)

**Frequent synonyms / misidentifications:** *Liocranchia intermedia* Robson, 1924; *Fusocranchia alpha* Joubin, 1920 / None.

**FAO names:** **En** – Reinhardt's cranch squid; **Fr** – Encornet-outré de Reinhardt; **Sp** – Cranquiluria de Reinhardt.

**Diagnostic characters:** Medium-size animal, mantle elongate and spindle-shaped (larva often inflated to stout, elliptical shape) tapers posteriorly to narrow point. Walls thin and leathery. **Two moderately long cartilaginous strips diverge from apex of funnel-mantle fusions in inverted V-shaped pattern. A row of cartilaginous tubercles reaching the beginning of fin running along the dorsal median line above gladius. Fins 23 to 35% of mantle length, nearly circular in combined outline unite posterior to end of mantle.** Head with medium to large, round, prominent sessile eyes. **A total of 14 light organs on eyeball.** Arms short (longest arm 35% of ML), narrow and muscular. A large light organ on ends of ventrolateral arms in mature females.

Ends of these arms of mature males are attenuated and bear 4 to 8 rows of very small suckers. Left or right ventral arm of mature males hectocotylized. Tentacle length about 60 to 70% of mantle length, with slightly expanded clubs and 20 to 23 small suckers in the dactylus disposed in 4 rows. A total of 10 rows in 4 rows attached by long peduncles and 20 carpal suckers in 2 rows.

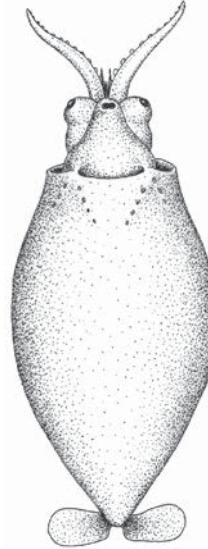
**Size:** Maximum size up to 250 mm mantle length.

**Habitat, biology, and fisheries:** A meso-bathypelagic species. Found from 100 to about 1 200 m depth. The paralarvae and juvenile are planktonic, live in shallower waters, and their shape is rather different than adults. This species undertake important changes in shape during its life cycle. Adults undertake vertical migrations. The maximum estimated age from the statoliths of animals ranging from 100 to 205 mm mantle length was 146 days. Males tend to be larger than the same-aged females. The hatching period in the central-east Atlantic goes from April to June, with a clear peak in May. This species seem to spawn at great depths and it is likely that just after hatching, small paralarvae ascend to epipelagic waters, which was confirmed by captures of paralarvae of 2.4 mm mantle length in the superficial water layer of the open tropical Atlantic. During the first 4 to 5 months of their ontogenesis feed and grow quickly in the epipelagic waters, attain 170 to 200 mm mantle length and then move onto deeper water for maturation and subsequent spawning. The tubercles are composed by cartilaginous elastic tissue that could serve as insertion and support of the muscles, helping that way to the displacement of the animal. None interest to fisheries.

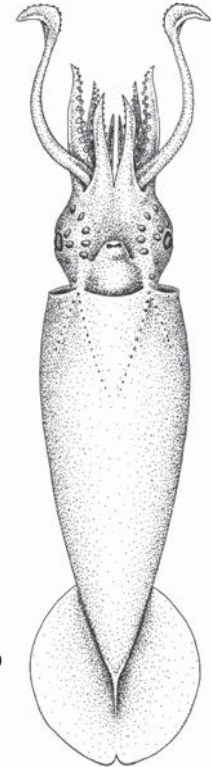
**Distribution:** Distributed circumglobally in tropical and subtropical waters, recorded from 50°N to about 35°S, generally bounded by the north and south tropical convergences.



hectocotylus



paralarvae



ventral view

(all illustrations from Guerra, 1992)





***Megalocranchia oceanica* (Voss, 1960)**

**Frequent synonyms / misidentifications:** *Corynomma speculator* Chun, 1910 / *Megalocranchia maxima* Pfeffer, 1884.

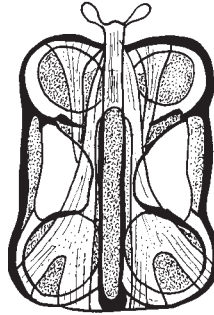
**FAO names:** En – Oceanic cranch squid; Fr – Encornet-outré océanique; Sp – Cranquiluria oceánica.

**Diagnostic characters:** Mantle slender, elongate, tapering posteriorly to slender point. No tubercles present on elongate, usually roughly triangular funnel fusion cartilages or on conspicuous spindle-shaped nuchal fusion cartilage. Long, lanceolate, terminal-lateral fins extending from the tip of gladius onto lateral margins of mantle for approximately one-half of the mantle length. Funnel extends to approximately mideye level. Very large and nearly spherical eyes with 2 light organs on ventral surface. Arms short and stout. Tentacles short, strong, without hooks. **Rounded digestive gland with large bilobed light organs covering entire ventral surface.**

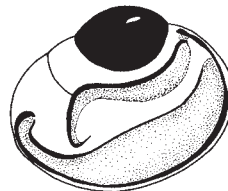
**Size:** To 810 mm mantle length.

**Habitat, biology, and fisheries:** Epimesopelagic squids. Inhabits subsurface waters may occurs in depths greater than 1 000 m. Not of interest to fisheries.

**Distribution:** Atlantic tropical and subtropical waters.

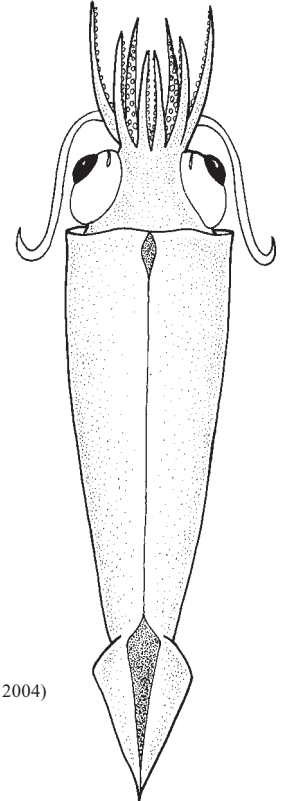


visceral light organ



eye light organ

(all illustrations after Okutani, 2004)



dorsal view



***Sandalops melancholicus* Chun, 1906**

**Frequent synonyms / misidentifications:** *Uranoteuthis bilucifer* Lu and Clarke, 1974 / None.

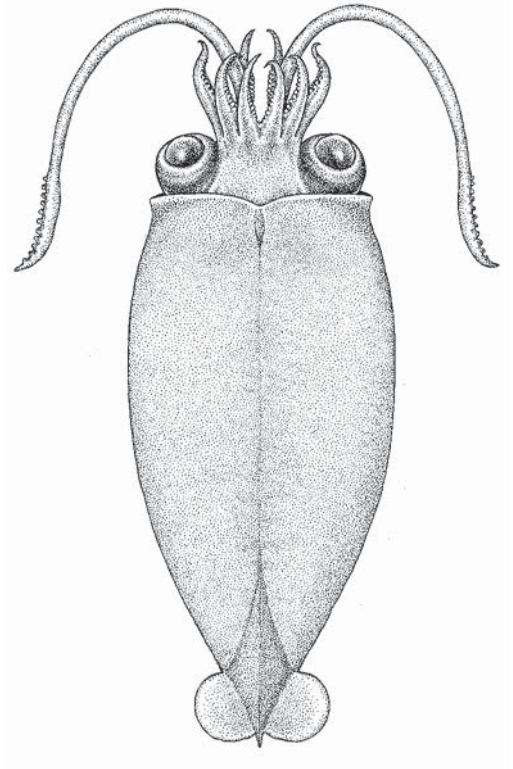
**FAO names:** **En** – Melancholy cranch squid; **Fr** – Encornet-outré mélancolie; **Sp** – Cranquiluria afligida.

**Diagnostic characters:** The eyes are long, tubular in paralarvae and particularly in juveniles when they occupy the upper mesopelagic zone; **eyes oriented vertically upward. In subadults the eyes become nearly hemispherical.**

**Size:** Maximum mantle length to 110 mm.

**Habitat, biology, and fisheries:** *Sandalops melancholicus* lives in epipelagic, mesopelagic and bathypelagic zones, following the general cranchiid pattern of ontogenetic descent. By full growth, animals have descended into the bathypelagic zone beyond 2 000 m depth, where maturation and mating occur. No evidence currently exists for diel vertical migration.

**Distribution:** The species is cosmopolitan in tropical and subtropical waters.



**dorsal view**

(illustration: K. Hollis/ABRS)



***Taonius pavo* (Lesueur, 1821)**

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

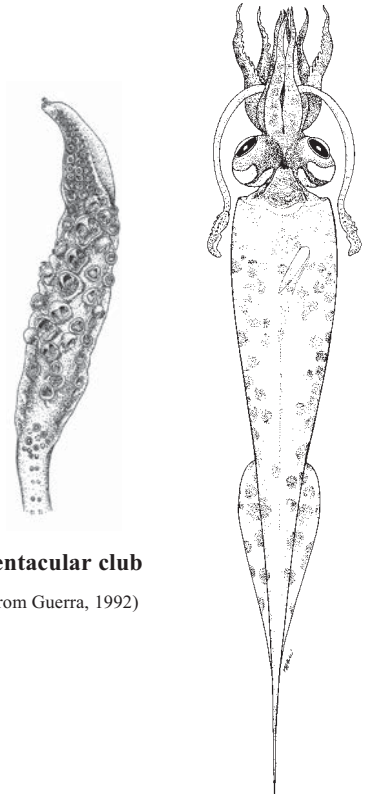
**FAO names:** **En** – Peacock cranch squid; **Fr** – Encornet-outré paon; **Sp** – Cranquiluria pavo.

**Diagnostic characters:** **Mantle jelly-like fused with head and funnel in the nuchal region.** The mantle is very long and slender, narrow and cone- shape, and without hyalines stripes on its ventral side. Fins paddle-shaped in paralarvae (< or = 18 mm ML), inserted on elongate, diamond-shape lanceola; fins and posterior end of the gladius elongate early with growth, becoming very attenuate posteriorly; eyes elliptical to oval, on long stalks in paralarvae (< or = 22 mm ML); with growth, eyes become tubular in juvenile, with large tripartite-appearing light organs on posteroventral surface. Midarm suckers on arms II and III with low teeth on distal margins. **Suckers of manus of the tentacular club with 1 or 2 large, central, hook-like teeth** first have seen forming on rings of median suckers in juvenile of about 60 mm mantle length.

**Size:** Maximum mantle length 660 mm.

**Habitat, biology, and fisheries:** Epi-mesopelagic oceanic species. Paralarvae with long and stalked eyes (<20 mm ML) epipelagic (from the surface to 200 m depth); juvenile (25 to 30 mm ML) between about 400 and 600 m; large juvenile, with growth, progressively extend range to greater depths up to 700 m. Maturation occurs in deep waters to at least 2 000 m. Captures of mature females at the surface at night indicate that spawning occurs in shallow water. There is not evidence of diel vertical migration, but subadults appear to range widely in water column. It has been found in the stomachs of sperm whales, tuna, big teleosts and marine birds. None interest to fisheries.

**Distribution:** Widely distributed in the Atlantic Ocean from approximately 45°N to possible the Southern Subtropical Convergence, and may extend into the western Indian Ocean in the area of Agulhas Current.



**tentacular club**

(from Guerra, 1992)

**adult  
dorsal view**



***Teuthowenia maculata* (Leach, 1817)**

**Frequent synonyms / misidentifications:** *Teuthowenia megalops* (Prosch, 1847) / None.

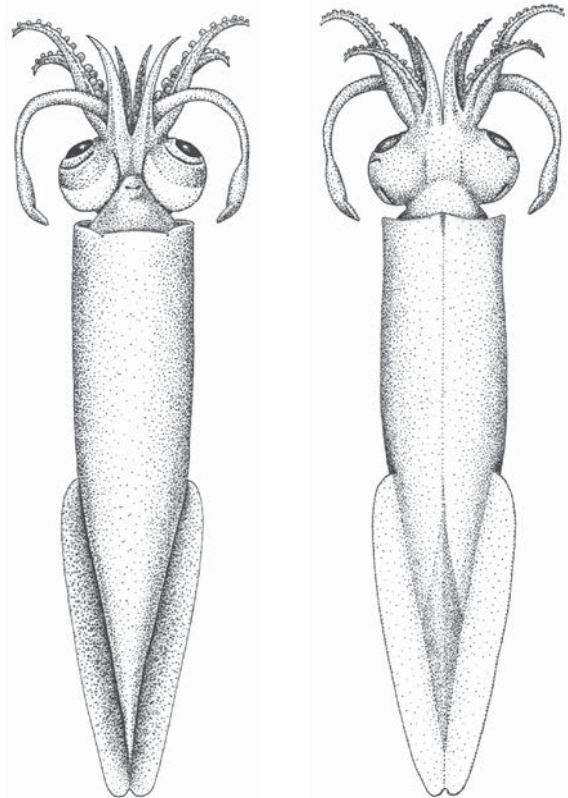
**FAO names:** **En** – Spotted cranch squid; **Fr** – Encornet-outré tacheté; **Sp** – Cranquiluria maculada.

**Diagnostic characters:** Conical and coriaceous firm mantle, elongate and tapering posteriorly. Funnel-mantle fusion cartilages with 1 single-point, poorly developed tubercle at mantle margin. Largest arm III suckers 3 times basal suckers in diameter. **Arms I and II of males with 25 to 27 pairs of normal, wide-aperture, suckers prior to modified, slightly swollen, terminal portions which are provided of 3 or 4 series of modified suckers until the tip. Largest club suckers with 22 to 26 teeth.**

**Size:** The largest known specimen is an immature male of 143 mm mantle length.

**Habitat, biology, and fisheries:** Epi- to bathypelagic squid. Caught in open nets from 25 to 2 000 m. Paralarvae (10 to 16 mm ML) near-surface layer, specimens of about 40 mm mantle length descend to depths between 300 and 600 m; juveniles of 50 to 60 mm mantle length were taken during the day and night in depths of 600 to 700 m. There are, however, captures of small and large specimens until 2 000 m depth. The species undertakes vertical migrations and ontogenetic descent. Not of interest to fisheries.

**Distribution:** Eastern North and South Atlantic Ocean, from about 20°N to around 20°S.



ventral view

dorsal view

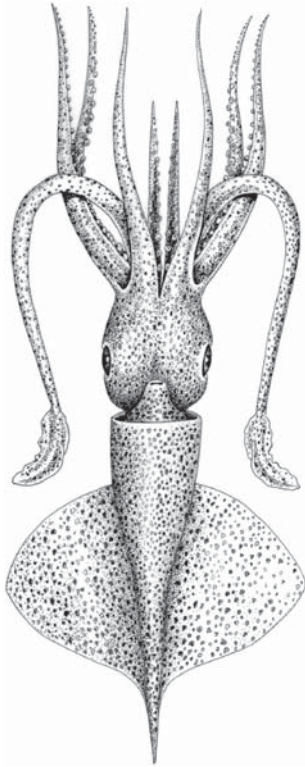
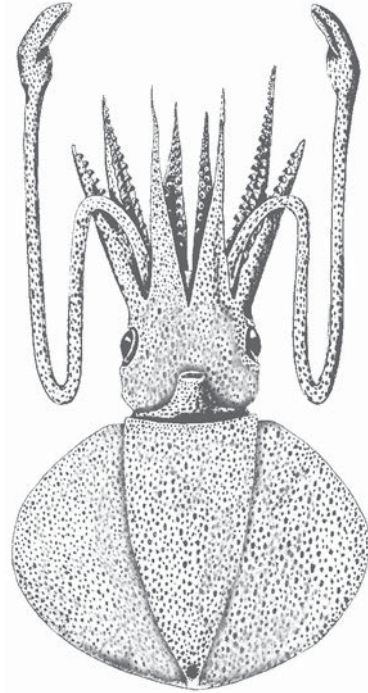
(illustrations from Guerra, 1992)



## CYCLOTEUTHIDAE

## Disc-fin squids

**D** **Diagnostic characters:** Fins large in adults (greater than 70% ML), disc-like. Buccal connectives attached to ventral borders of arms IV. **Triangular funnel-locking apparatus.** Arm suckers biserial. Tentacular club with quadraserial suckers. **Light organs** present. **Hectocotylus** absent.

*Cycloteuthis**Discoteuthis*

**Habitat, biology, and fisheries:** Very little is known about the biology of any species in the family. Mesopelagic squids.


**Similar families occurring in the area**




None.

**Key to the species of Cycloteuthidae occurring in the area**

- 1a. Tail and large visceral light organ present . . . . . ***Cycloteuthis sirventi***  
 1b. Tail and visceral light organ absent . . . . . → 2
- 2a. Four light organs around each eye; a single and prominent light organ located ventrally near the posterior apex of the mantle; no light organ on each side near the edge of the membrane that connects the bases of arms III and IV. . . . . ***Discoteuthis discus***  
 2b. Two light organs around each eye; no light organ near posterior apex of the mantle; a small, round light organ on each side near the edge of the membrane that connects the bases of arms III and IV. . . . . ***Discoteuthis laciniosa***

**List of species occurring in the area**

The symbol  is given when species accounts are included.

-  *Cycloteuthis sirventi* Joubin, 1919.  
 *Discoteuthis discus* Young and Roper, 1969.  
 *Discoteuthis laciniosa* Young and Roper, 1969

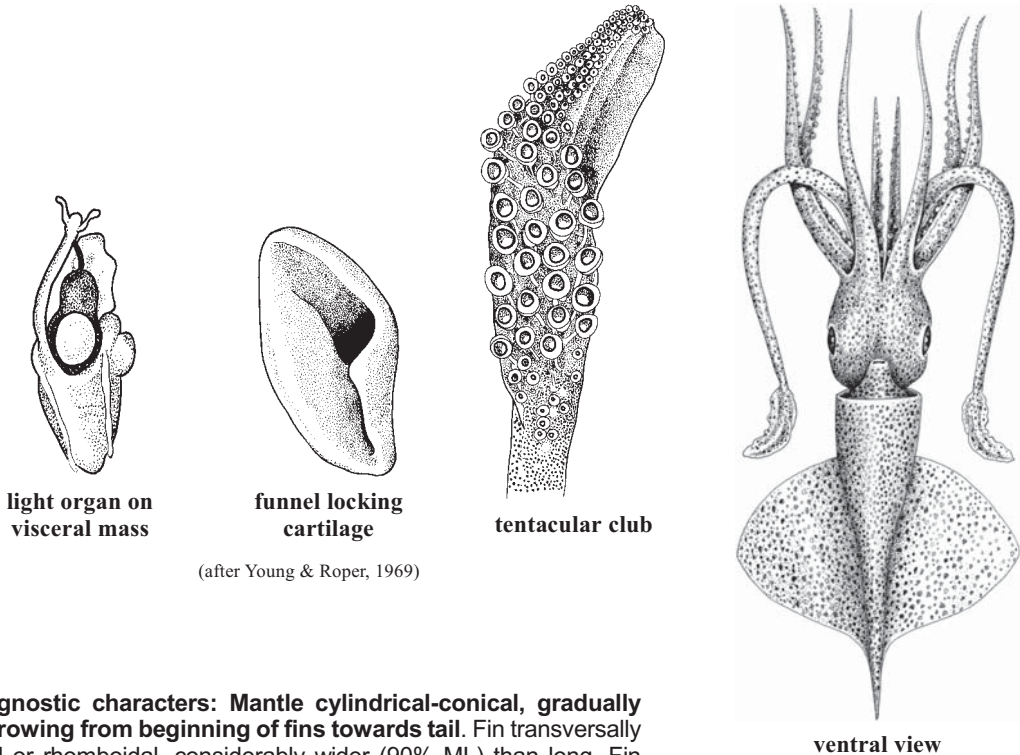
**References**

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***Cycloteuthis sirventi* Joubin, 1919**

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

**FAO names:** **En** – Sirvent's disc-fin squid; **Fr** – Discoloutène de Sirvent; **Sp** – Discoluria de Sirvent.



**Diagnostic characters:** Mantle cylindrical-conical, gradually narrowing from beginning of fins towards tail. Fin transversally oval or rhomboidal, considerably wider (90% ML) than long. Fin length in adults approximately 80% mantle length. Arms with 2 rows of suckers. Tentacles long and robust. Tentacular clubs with 4 rows of suckers; manus suckers equal in size; carpus ill-defined with 6 or 7 suckers and knobs. Funnel locking cartilage subtriangular. Buccal connective attach to ventral borders of arms IV. **A conspicuous visceral light organ is present**; and between 15 and 30 yellow and small light organs on the eyes in adults.

**Size:** Maximum mantle length 50 mm.

**Habitat, biology, and fisheries:** This species is known from few individuals. Collected with open nets between 10 and 790 m. No interest to fisheries.

**Distribution:** Throughout the Atlantic warm waters, from approximately 37°N and 8°S. Western Mediterranean Sea. Indo-West Pacific.

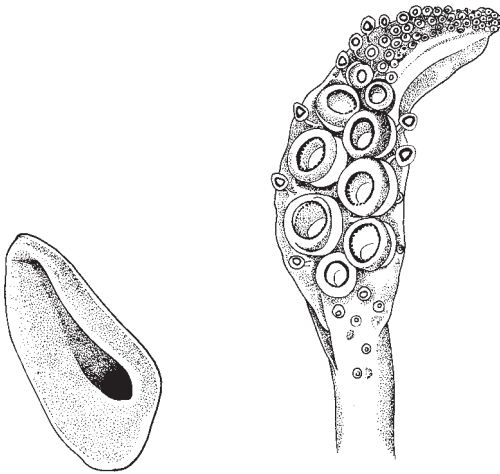
**Remarks:** The other species of this genus, *Cycloteuthis akimuskini* Filippova, 1968 has been considered a synonymy of *C. sirventi* (Clarke, 1980).



*Discoteuthis discus* Young and Roper, 1969

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

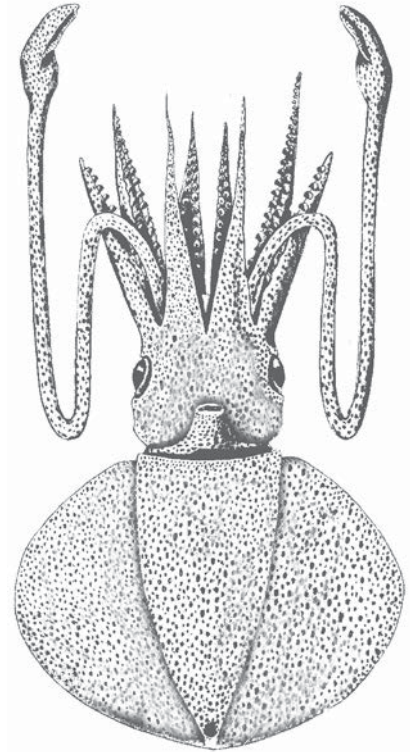
**FAO names:** En – Rounded disc-fin squid; Fr – Discoloutène rond; Sp – Discoluria rotunda.



funnel locking cartilage

tentacular club

(after Young & Roper, 1969)



ventral view

**Diagnostic characters:** Mantle nearly conical tapering posteriorly to a slightly rounded point; **a true tail absent**. Mantle width about 50% mantle length, it is free in its anterior end. The fins are huge and broadly oval in outline; they extend nearly the entire length of the mantle (98% ML) and are very broad. Fin width about 40% greater than mantle length. **Funnel locking cartilage subtriangular and encircled by a broad nearly membranous flange**. Arms suckers arranged in 2 rows, the suckers are large, globular and relatively few in number. Tentacles very long (1.5 time in ML). The tentacular clubs expanded and flattened bearing 4 rows of suckers in the manus, the 6 to 9 suckers in 2 medial rows greatly enlarged. **Four light organs around the eye, and a dark, round light organ on the ventral surface of the posterior tip of the mantle. The pen is extremely tick.**

**Size:** Maximum mantle length 90 mm.

**Habitat, biology, and fisheries:** This species is known from few individuals. Occurring in depths from 200 to 750 m. Undertakes allometric changes during growth associated with the length of the fins and the pen. None interest to fisheries.

**Distribution:** Atlantic warm waters: Gulf of Guinea; off northeast coast of South America and Caribbean Sea. Pacific and Indian Oceans.

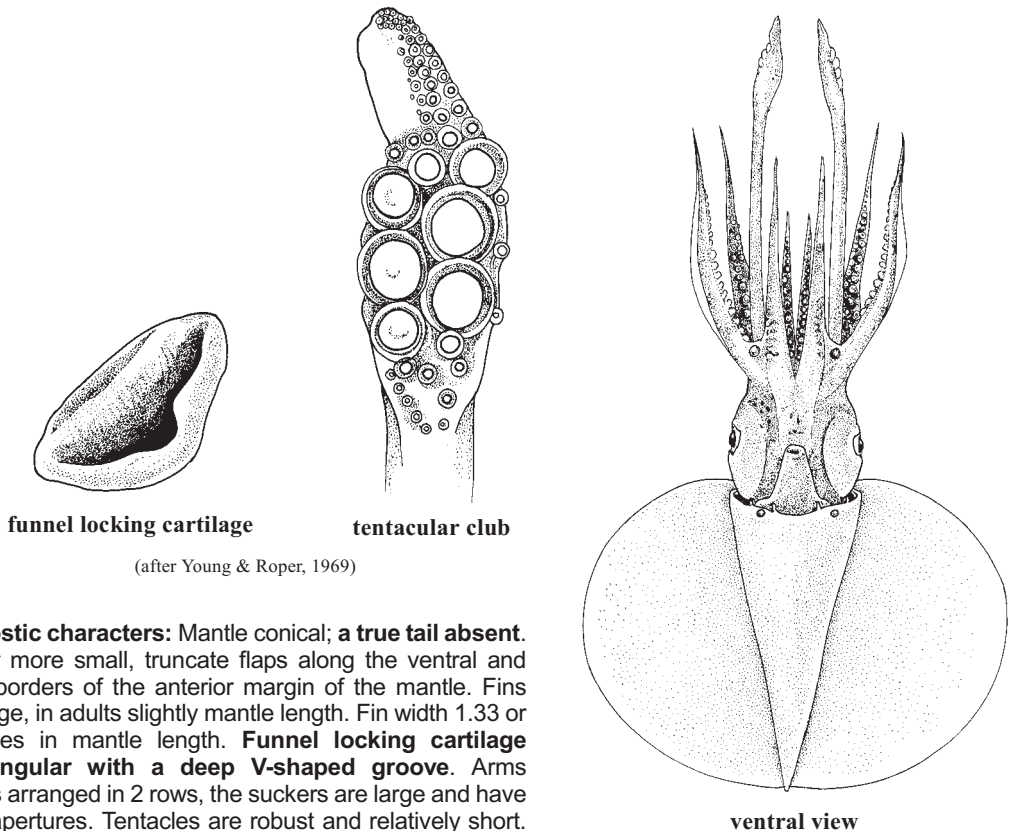




***Discoteuthis laciniosa* Young and Roper, 1969**

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

**FAO names:** **En** – Crenellate disc-fin squid; **Fr** – Discoloutène crénelée; **Sp** – Discoluria crenulada.



**Diagnostic characters:** Mantle conical; **a true tail absent.** Four or more small, truncate flaps along the ventral and lateral borders of the anterior margin of the mantle. Fins very large, in adults slightly mantle length. Fin width 1.33 or 1.5 times in mantle length. **Funnel locking cartilage subtriangular with a deep V-shaped groove.** Arms suckers arranged in 2 rows, the suckers are large and have broad apertures. Tentacles are robust and relatively short. The tentacular clubs expanded and flattened bearing 4 rows of suckers in the manus, 6 or 7 suckers in 2 medial rows enormously enlarged. A small light organ embedded near the edge of the membrane that passes between the III and IV arms on each side, and 2 small light organs ventrolaterally near the free margin of the mantle. **No light organs around the eye.**

**Size:** Maximum mantle length 70 mm.

**Habitat, biology, and fisheries:** This species is known from few individuals. Captured in open nets at depths between 100 and 1 000 m. None interest to fisheries.

**Distribution:** Tropical, subtropical Atlantic: off west Africa; Madeira; Cape Verde Islands; in the Tongue of the Ocean, Bahama and off Bermuda. Pacific and Indian Oceans.



Oegopsid Squids

ENOPLOTEUTHIDAE

Enope squids

**Diagnostic characters:** Straight funnel-locking apparatus. Eight buccal lappets and buccal connectives that attach dorsally to the ventral arms. **Hooks present on all arms.** Tentacular clubs with 1 or 2 series of hooks on manus (except *Pterygioteuthis*, which lacks hooks in the tentacular club); armature on manus in 2 or 3 series. **Light organs present on mantle, funnel, head, eyeballs and arms;** on eyeballs in single line; anterior and posteriormost light organs generally largest; light organs absent from tentacles, viscera and most of fins. Tail with vesicles, broad and extends well beyond conus of gladius. **Nidamental glands absent.**

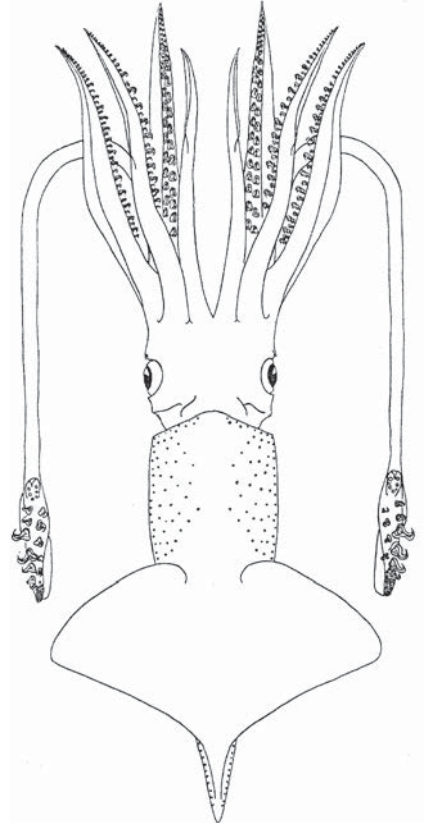
**Habitat and biology:** All open-ocean species occupy the upper mesopelagic. In the regions where the mesopelagic zone intersects the slopes of land masses (i.e. the mesopelagic boundary zone) some species may occur at shallower depths. Many species are known to undergo extensive daily vertical migrations and this habit may be characteristic of all species in the family.

Similar families occurring in the area

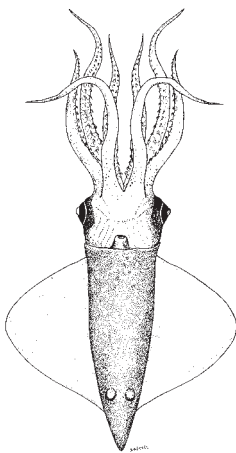
Octopoteuthidae: adult lacks tentacles; together with Pyroteuthidae and Lycoteuthidae, possesses visceral light organs.

Pyroteuthidae: lacks light organs on mantle and surface of head or arms.

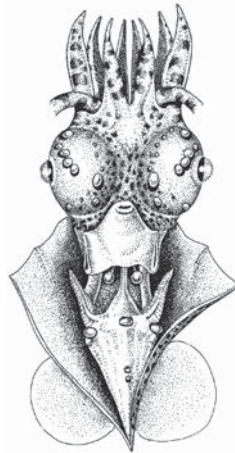
Lycoteuthidae and Onychoteuthidae: have suckers rather than hooks on arms.



dorsal view

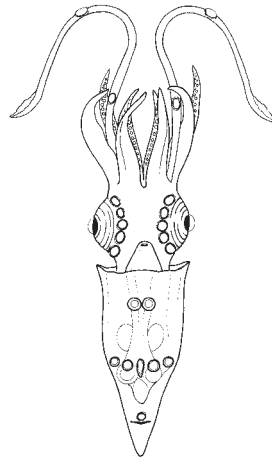


Octopoteuthidae

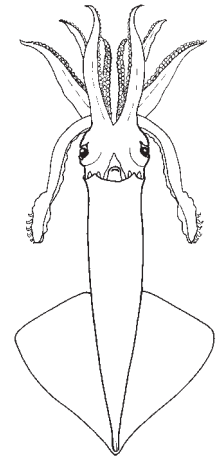


Pyroteuthidae

(from Guerra, 1992)



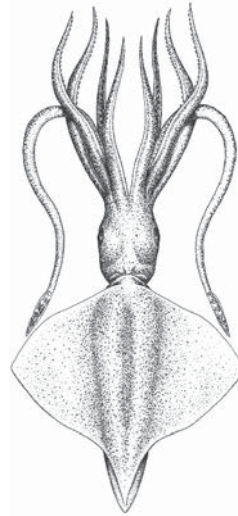
Lycoteuthidae



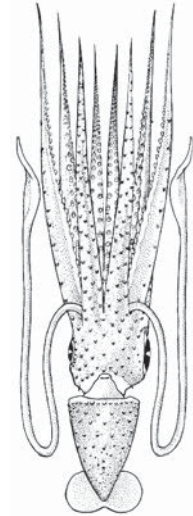
Onychoteuthidae

Ancistrocheiridae: has light organs on tentacles but not on eyeballs.

Histioteuthidae: has normal suckers rather than hooks on arms.



**Ancistrocheiridae**  
(from Guerra, 1992)











**Histioteuthidae**

**Key to the species of Enoploteuthidae occurring in the area**

- 1a. Posterior fin insertion anterior to tail . . . . . ***Enoploteuthis* → 6**
- 1b. Fins extend along lateral sides of tail. . . . . → 2
  
- 2a. Two to 4 large, dark light organs at tips of ventral arms . . . . . ***Abraliopsis* → 4**
- 2b. No large dark light organs at tips of ventral arms . . . . . ***Abralia* → 3**
  
- 3a. Arms with 3 or 4 terminal sucker rows; left arm IV hectocotylized; 3 to 5 tentacular hooks; subocular light organs of 2 types. . . . . ***Abralia veranyi***
- 3b. Arms with 2 terminal sucker rows; right arm IV hectocotylized; 2 to 4 tentacular hooks; subocular light organs of 1 type . . . . . ***Abralia redfieldi***
  
- 4a. Light organs uniformly scattered on ventral surface of head . . . . . ***Abraliopsis pfefferi***
- 4b. Light organs on ventral surface of head form distinct longitudinal rows . . . . . → 5
  
- 5a. Hooks 2 or 3 times longer than the width of the club; 8 longitudinal rows of photophores on ventral side of head, the median one consisting on 2 parallel rows . . . . ***Abraliopsis gilchristi***
- 5b. Hooks 1.5 times longer than the width of the club; 7 longitudinal rows of photophores on ventral side of head . . . . . ***Abraliopsis atlantica***
  
- 6a. Tentacles short and weak, with no ventral flap; fixing apparatus elongate; dactylus suckers in 2 longitudinal rows; hectocotylized right arm IV with a single ventral flap; many small papillae present on oral surfaces of arms I to III . . . . ***Enoploteuthis leptura leptura***
- 6b. Tentacle long and robust, with a ventral flap and oval fixing carpal apparatus; dactylus suckers in 4 longitudinal rows; hectocotylized right arm IV with 2 prominent, unequal-sized, offset crests, the distal crest dorsal and proximal crest ventral . . . . . ***Enoploteuthis anapsis***

### List of species occurring in the area

The symbol  is given when species accounts are included.

-  *Abralia redfieldi* Voss, 1955.
-  *Abralia veranyi* (Rüppell, 1844).
-  *Abraliopsis atlantica* Nesis, 1982.
-  *Abraliopsis gilchristi* (Robson, 1924).
-  *Abraliopsis morisii* (Vérany, 1839).
-  *Enoploteuthis anapsis* Roper, 1964.
-  *Enoploteuthis leptura leptura* (Leach, 1817).

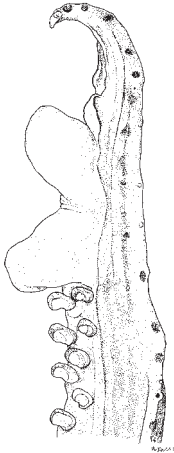
### References

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*Abralia redfieldi* Voss, 1955

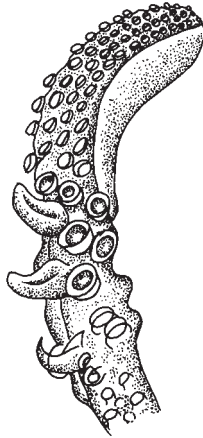
**Frequent synonyms / misidentifications:** None / None.

**FAO names:** **En** – Redfield's enope squid; **Fr** – Encornet de Redfield; **Sp** – Enoploluria de Redfield.

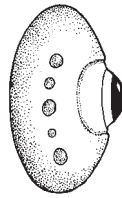


**hectocotylus**

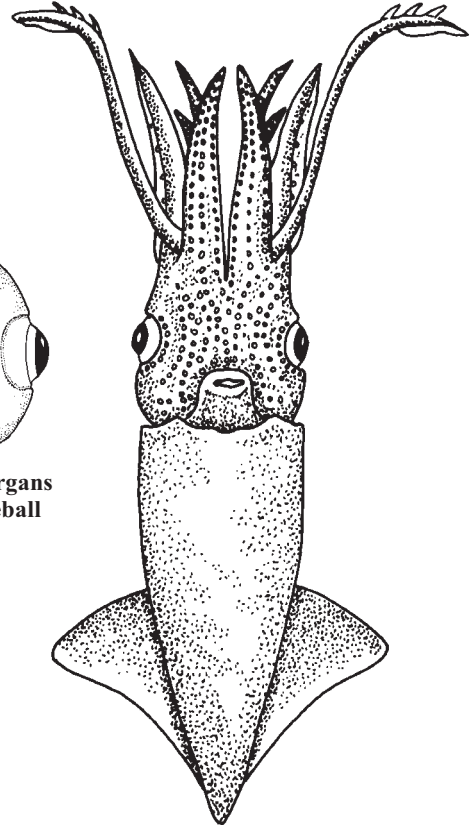
(after Cairns, 1976)



**tentacular club**



**light organs  
in eyeball**



**ventral view**

**Diagnostic characters:** Mantle conical, with broad fin. **Arms with 5 to 8 pairs of hooks on proximal two-thirds and biserial suckers distally.** Right ventral arm hectocotylized in males, with 2 large proximal flaps and a smaller distal one. Tentacular club with 2 to 4 hooks. Ventral surface of mantle and head covered with numerous scattered light organs but leaving a bare stripe along the ventral mantle midline. **Five optic light organs, the first, third and fifth larger than second and fourth.**

**Size:** Maximum mantle length about 30 mm.

**Habitat, biology, and fisheries:** Inhabits waters of 50 to about 700 m at night, 720 m at dawn and 70 to 300 m by day. The only known predator is *Kogia simus* (dwarf sperm whale). Not of interest to fisheries.

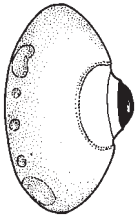
**Distribution:** Amphi-Atlantic, tropical to temperate and bicentral, mainly in western Atlantic from New England to the Caribbean and Suriname to southern Argentina. Guinea Bissau and South Africa in the eastern Atlantic.



***Abralia veranyi* (Rüppell, 1844)**

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

**FAO names:** **En** – Verany's enope squid; **Fr** – Encornet de Verany; **Sp** – Enoploluria de Verany.



light organs on eyeball



hectocotylus



tentacular club

(from Guerra, 1992)

**Diagnostic characters:** Mantle conical, with sagittate posterior fins. Arms I to III with biserial suckers proximally, of which several may change into hooks proximally; **minute distal suckers in 3 or 4 series**. Left ventral arm hectocotylized in males, with a pair of fleshy distal flaps. Tentacular club with 3 or 4 hooks and a dorsal membrane. Ventral surface of mantle, head and arms covered with numerous scattered light organs. **Five optic light organs, the terminal 2 oval and larger than the middle 3 rounded ones.**

**Size:** Maximum mantle length 49 mm.

**Habitat, biology and fisheries:** Mesopelagic and bathypelagic, at the bottom in bathyal and in midwater above slopes, sometimes at the surface; absent in open ocean far from slopes. Inhabits waters around 0 to 200 m at night, 300 to 800 m by day, making diurnal vertical migrations. Forms groups in relatively abundant numbers; at Funchal, Madeira, makes summer migrations, probably for mating or spawning; spermatophores attached to seminal receptacle on nuchal cartilage and spawning is intermittent and prolonged. This species has been recorded from the stomachs of sharks, teleost and dolphins. Not of interest to fisheries.

**Distribution:** The most widely distributed species of *Abralia* in the Atlantic. Amphi-Atlantic, tropical and subtropical, associated with neritic-oceanic, near-slope waters. Madeira, Mauritania, Guinea Bissau, Côte d'Ivoire, Equatorial Guinea to Angola; Mediterranean Sea; western Atlantic from Georges Bank to southern Brazil.



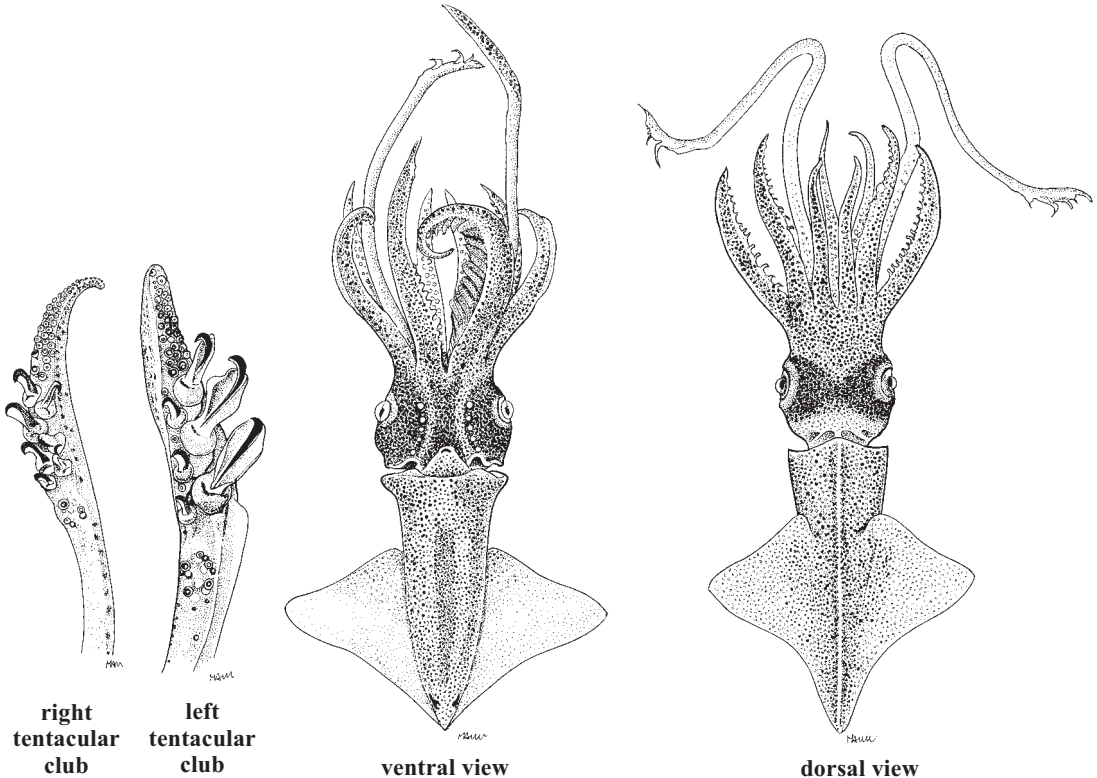
dorsal view



***Abrialiopsis atlantica*** Nesis, 1982

**Frequent synonyms / misidentifications:** *Abrialiopsis morisii* Chun, 1910 (part) / None.

**FAO names:** **En** – Atlantic firefly squid; **Fr** – Encornet de l'Atlantique; **Sp** – Enopololuria atlántica.



(all illustrations after Chun, 1910)

**Diagnostic characters:** The tentacular club lacks of membrane and keel except in the dactylus where a narrow protective membrane is present. Club hooks small, no more than 1.5 times the club width. Left ventral arm of male with widened orange ventral protective membrane. Photophores (light organs) on ventral side of mantle arranged in distinct isolated longitudinal rows. Seven longitudinal rows of photophores on ventral side of head. **No additional photophores between the median row and the lateral ones.**

**Size:** Maximum mantle length 28 mm in males, 33 mm in females.

**Habitat, biology, and fisheries:** A little-known species. Depth between 97 and 786 m, larvae and early juveniles in 20 to 50 m, mainly in the thermocline at 25 to 35 m, at least 80 km from shore. Mean daily growth rate 0.076 to 10.4% mantle length and 0.48 to 6.3% body weight, maximum known age 140 days. Not of interest to fisheries.

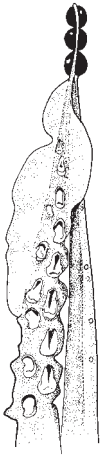
**Distribution:** Equatorial East Atlantic, Gulf of Guinea, west of Liberia, northern Namibia; South Africa; Caribbean Sea and Gulf of Mexico.



***Abrialiopsis gilchristi* (Robson, 1924)**

**Frequent synonyms / misidentifications:** *Enoploteuthis neozelandica* Dell, 1959 / None.

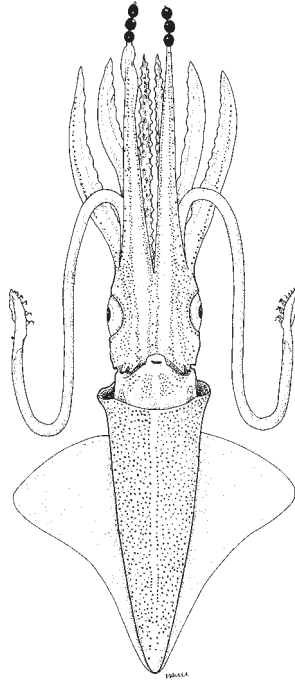
**FAO names:** **En** – Gilchrist's firefly squid; **Fr** – Encornet de Gilchrist; **Sp** – Enoploluria de Gilchrist.



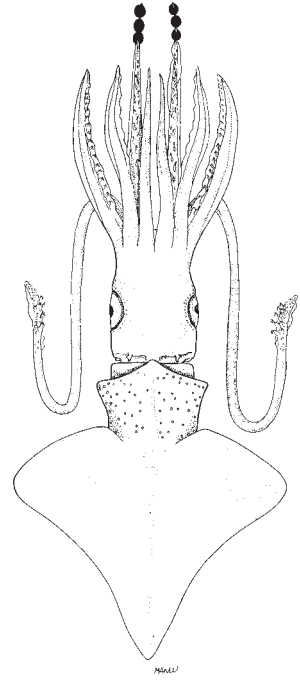
hectocotylus



tentacular club



ventral view



dorsal view

**Diagnostic characters:** The buccal membranes coloured a dark violet with numerous small papillae on the dorsal surface. Arms with 2 rows of very sharp, slender, strongly curved hooks, which become extremely minute distally and are followed immediately by minute suckers in 2 rows. Trabeculae of protective membrane of

left ventral arm of male elongated and thickened but not joined by a wide membrane. Three large photophores on the tip of each ventral arm. **In central part of tentacular club (manus) there are 3 or 4 small hooks on the dorsal side and 4 large (2 to 3 times longer than the width of the club) hooks on ventral side.** The dactylus of the club is very short and has about 12 transverse rows of suckers in 4 longitudinal rows. **Eight rows of photophores on the ventral side of the head arranged on a linear longitudinal pattern, the median one consisting of 2 parallel rows.** The 5 round and reddish brown in colour photophores on the eyeball are located on the ventral periphery. **The right ventral arm is hectocotylized in males and is composed of 3 subequal-sized offset crest.**

**Size:** Maximum mantle length 40 mm in females.

**Habitat, biology, and fisheries:** Mesopelagic and mesobathypelagic species at night ascending into epipelagic zone. One of the most abundant micronektonic mesopelagic squids off southern Namibia. Depth 0 to about 1 200 m, mainly 0 to 200 m, 27 to 162 km from shore. Feeds mainly copepods, and to a lesser extent on euphausiids and hyperiid amphipods. In the central South Pacific, all were immature in April, maturing in July, the majority mature or spent in September. The seminal receptacles in this species are the anterior pockets under collar on sides of nuchal cartilage and in a median pocket on inner mantle. Not of interest to fisheries but possibly an important prey item for larger oceanic species.

**Distribution:** Walvis Bay to east London and probably also northern Namibia. Circumglobal, southern subtropical belt of the Atlantic, Indian and Pacific Oceans from 20° to 45°S.

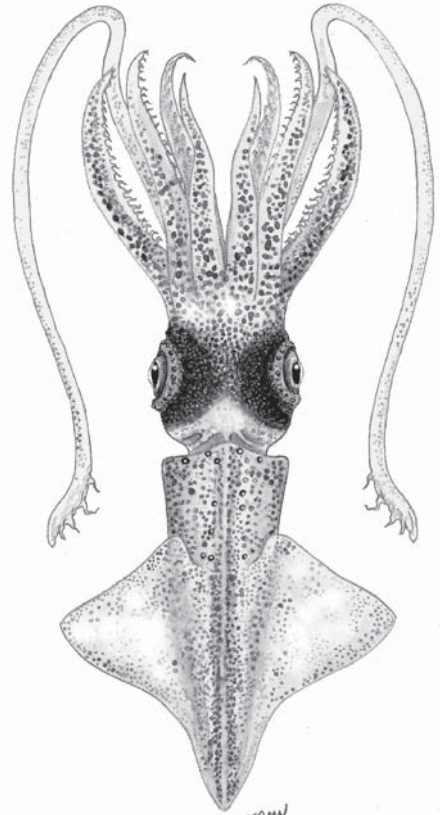
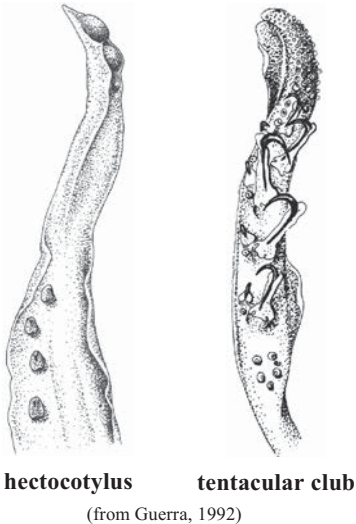




***Abrialiopsis morisii* (Vérany, 1839)**

**Frequent synonyms/ misidentifications:** *Abrialiopsis pfefferi* Joubin, 1896; *Compsoteuthis lonnbergi* Pfeffer, 1900; *Abrialia (Compsoteuthis) jattai* Pfeffer, 1912 / None.

**FAO names:** **En** – Pfeffer's firefly squid; **Fr** – Encornet de Pfeffer; **Sp** – Enoploluria de Pfeffer.



**dorsal view**

**Diagnostic characters:** Mantle long, conical and slender, tapering to a sharp point posteriorly. Tentacular clubs with 9 or 10 different-sized hooks in 2 rows on manus, a carpal flap and distinct aboral keel. Arms with 2 rows of very sharp, slender, strongly curved hooks. **Three large photophores on the tip of each ventral arm.** Arms IV relatively long, 94 to 101% mantle length, with 14 to 22 hooks. **Hectocotylus with 2 flaps of different sizes:** a long narrow proximal flap and a short distal one; modified portion of arm with hooks. Numerous scattered photophores on the ventral side of head.

**Size:** Maximum mantle length of females 42 mm; males 35 mm.

**Habitat, biology, and fisheries:** A meso- and bathypelagic species, rising to epipelagic zone at night. Depth ranges from 0 to 3 660 m; 0 to 750 m at night, 0 to 1 900 m by day. Found 145 km to more than 463 km from shore. Males mature at 120 to 130 days and females at 150 to 160 days. Minimum mature age is 105 days in males, 127 days in females. Spawns in summer off Delaware Bay and undergoes vertical migration, mainly at 0 to 100 m at night but dispersed throughout a wide depth range, 0 to 1 000 m with apparent concentrations at 500 to 600 m and 800 to 900m, by day. The only known predator is *Stenella coeruleoalba* (striped dolphin). Not of interest to fisheries.

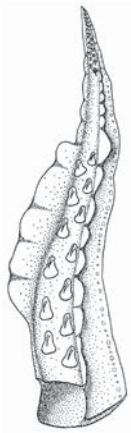
**Distribution:** Mediterranean Sea. Tropical to warm temperate Atlantic. Eastern Atlantic from Gibraltar to 25°S; western Atlantic from 45°N to subantarctic waters.



*Enoploteuthis anapsis* Roper, 1964

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

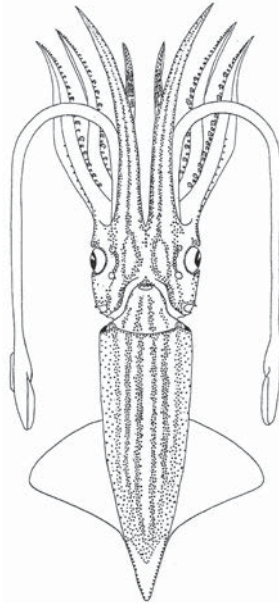
**FAO names:** **En** – Starlit enope squid; **Fr** – Encornet étoile; **Sp** – Enoploluria estrellada.



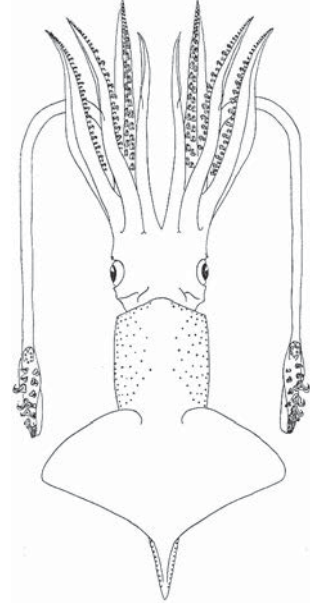
hectocotylus



tentacular club



ventral view



dorsal view

(all illustrations from Roper, 1964)

**Diagnostic characters:** Mantle elongate and conical, muscular anteriorly but posteriorly to the fins with a tip thin-walled and saccate, occupied by small-filled compartments which give a honey-combed appearance. **Four rows of distinct light organs on ventral side of the mantle, with the medial row free of light organs** (photophores) along its entire length. Tentacles long and robust, 1.3 to 2 times longer than mantle length; tentacular club well developed; the carpal cluster is a raised, ovoid structure consisting of a series of 3 or 4 suckers and knobs each, with interconnecting ridges and grooves; manus with dorsal and ventral membranes, with 2 rows of graded hooks with 5 to 7 hooks in each row, the distal hooks in both rows and, especially, the hooks in the middle-section of the ventral row are considerably larger than the others; **long dactylus with 4 rows of 40 to 50 minute suckers**. Right ventral arm hectocotylized, the ventral protective membrane weakly developed, the dorsal one with an enlarged flap in the zone that bears hooks; 2 rows of hooks on the two-thirds of the arm, **distal part of the arm devoid of hooks and suckers**; tip of the arm with small suckers.

**Size:** Maximum mantle length 79 mm in males, 77 mm in females.

**Habitat, biology, and fisheries:** Widely distributed in the tropical to warm temperate Atlantic, 0 to 200 m at night. Probably limited to mesopelagic and upper bathypelagic zones, migrating to the surface at night; depth range from 0 to 2 000 m. Known predators are black scabbardfish and blackfinned tuna. Not of interest to fisheries.

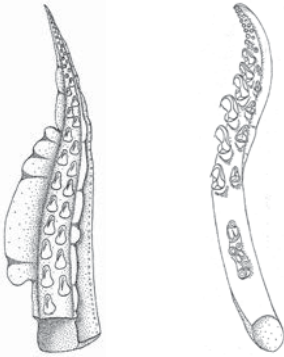
**Distribution:** Morocco, Madeira, Mauritania, central Atlantic and southeast of St Helena; western Atlantic from Straits of Florida to the Caribbean, Gulf of Mexico and Brazil east of Rio de Janeiro.



***Enoploteuthis leptura leptura* (Leach, 1817)**

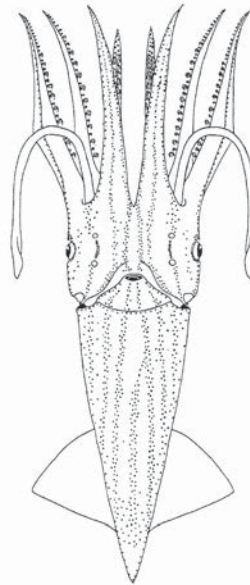
**Frequent synonyms / misidentifications:** None / None.

**FAO names:** **En** – Hooked enope squid; **Fr** – Enoploloutène crochu; **Sp** – Enoploluria uncinada.

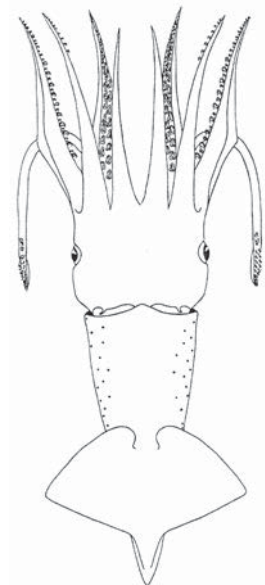


**hectocotylus      tentacular club**

**Diagnostic characters:** Mantle elongate and conical, muscular anteriorly but posteriorly to the fins with a tip thin-walled and saccate, occupied by small-filled compartments which give a honey-combed appearance. **Seven distinct light organ rows on ventral side of the mantle, single midline row merges with first lateral row on either side well short of anterior mantle margin;** third lateral pair extends shortly posterior to mantle margin. Ten more or less distinct light organ rows on ventral head surface; ventral middle line of head entirely devoid of light organs. Six light organs on funnel. **Tentacles short**, only a little longer than the arms; tentacular club long but not expanded; the carpal cluster is a raised, long structure consisting in a series of 4 or 5 suckers and knobs each with interconnecting ridges and grooves; manus not broad with 6 or 7 large hooks in ventral row and 4 or 5 smaller hooks in the dorsal row; **dactylus with 2 rows of 10 to 15 minute suckers.** Right ventral arm hectocotylized, the ventral protective membrane extremely narrow, the dorsal one with an enlarged flap; 2 rows of hooks extend along the arm; **there is not a zone of the arm devoid of hooks and suckers;** tip of the arm with small suckers.



**ventral view**



**dorsal view**

(all illustrations from Roper, 1966)

**Size:** Maximum mantle length 92 mm (mature female).

**Habitat, biology, and fisheries:** One of the largest oceanic enoploteuthids. Common in tropical and subtropical Atlantic, depth from 0 to 1 620 m. In the Gulf of Guinea small numbers of larvae were collected, both by day and night, in the upper 20 m in the South Tradewind current, juveniles of 20 to 40 mm near the frontal zone of the South Tradewind current and subtropical waters, adults mainly in subtropical waters. Spawning in the Gulf of Guinea is between January and September. Growth is relatively fast and maturation relatively early, lasting only a short period; males usually mature earlier (at 45 to 60 days) than females (at 80 to 90 days). Size and age at maturity: 50 mm mantle length and 70 days in males, 60 to 70 mm mantle length and 80 to 90 days in females. Maximum age is 153 days in mature males of 72 mm mantle length and 143 days in mature females of 92 mm mantle length. The only recorded predator of this species was yellowfin tuna. Not of interest to fisheries.

**Distribution:** Madeira, Morocco, Mauritania, Cape Verde Islands, Gulf of Guinea, Ghana and São Tomé and Príncipe, southwestern Africa; western Atlantic from Bermuda and the Caribbean to Brazil.



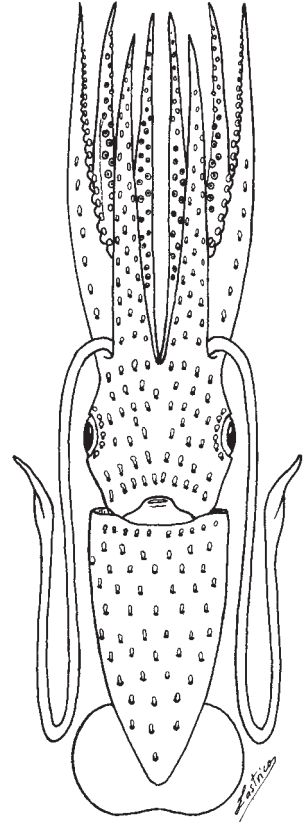
**HISTIOTEUTHIDAE**

**Jewel squids**

**Diagnostic characters:** Weakly-muscled species of moderate size. In general they have comparatively long, thick arms and short mantles with small, rounded fins. **Ventral surfaces of mantle, head and arms with anteriorly directed light organs with red colour filters.** Suckers on club in 4 or more irregular series. **Left eye larger than right eye.** Suckers on arms in 2 series. Buccal connectives attach to dorsal borders of ventral arms. A straight or slightly curved and slightly broad, simple, funnel locking cartilage. **Colour:** red, with very distinctive light organs.

**Habitat, biology, and fisheries:** Oceanic species. Ranges from epipelagic to bathypelagic and from subarctic to subantarctic. From the surface to 2 700 m. Some species appear to be found most frequently near continental slopes and islands. This family represents an important component of the diet of many oceanic toothed whales.

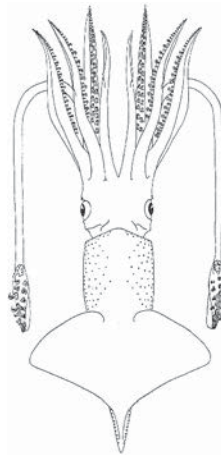
**Remarks:** The nomenclature and classification used herein is based on Voss *et al.* (1998). Subsequently, different interpretations have been introduced that depart from the earlier classification (see Young and Vecchione, 2000, 2008a, b, c).



ventral view

**Similar families occurring in the area**

Enoploteuthidae: have hooks rather than normal suckers on arms.



Enoploteuthidae

**Key to the species and subspecies of Histioteuthidae occurring in the area**

- 1a. Median row of tubercles on dorsal surface of mantle and basal portions of arms I-III present . . . . . ***Histioteuthis meleagroteuthis***
- 1b. Median row of tubercles on mantle and arms absent . . . . . → 2
  
- 2a. Single, large, terminal light organ on arms I-III or I-IV present . . . . . → 3
- 2b. Single, large, terminal light organ on arms absent . . . . . → 4
  
- 3a. Buccal membrane with 6 lappets and 1 connective to arms IV . . . . . ***Histioteuthis bonnellii***
- 3b. Buccal membrane with 7 lappets and 2 connectives to arms IV . . . . . ***Histioteuthis macrohista***

- 4a. Light organs large, arranged in widely to moderately widely spaced pattern on anterior one-third to half of ventral surface of mantle; cirlet around right eye composed of 16 or 17 (rarely 18 or 15) large light organs . . . . . → 5
- 4b. Light organs intermixed large and small, arranged in moderately dense pattern on ventral surface of mantle; cirlet around right eye composed of 17 large and 1 small light organs. . . . . ***Histioteuthis reversa***
  
- 5a. Light organs in widely spaced pattern on ventral surface of mantle; dorsal pad of funnel organ with 2 lateral flaps; skin conspicuously papillated (except in small juveniles) . . . . . ***Histioteuthis arcturi***
- 5b. Light organs in moderately widely spaced pattern on ventral surface of mantle; dorsal pad of funnel organ unsculptured; skin not papillated . . . . . → 6
  
- 6a. Terminal group of normal light organs on arms I-IV present, except in mature specimens, where terminal groups on arms I-III replaced by single, long, narrow, darkly pigmented light organ; suckers in median 2 or 3 rows of club manus slightly and approximately coequally enlarged . . . . . ***Histioteuthis celetaria celetaria***
- 6b. Terminal group of light organs on arms absent; suckers in median 2 or 3 rows of club manus larger than the marginal ones . . . . . ***Histioteuthis corona corona***

**List of species occurring in the area**

The symbol 🦑 is given when species accounts are included.

- 🦑 *Histioteuthis arcturi* (Robson, 1948).
- 🦑 *Histioteuthis bonnellii* (Férussac, 1834).
- 🦑 *Histioteuthis celetaria celetaria* (Voss, 1960).
- 🦑 *Histioteuthis corona corona* Voss and Voss, 1962.
- 🦑 *Histioteuthis macrohista* Voss, 1969.
- 🦑 *Histioteuthis meleagroteuthis* (Chun, 1910).
- 🦑 *Histioteuthis reversa* (Verrill, 1880).

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***Histioteuthis arcturi*** (Robson, 1948)

**Frequent synonyms / misidentifications:** *Histioteuthis dofleini* (Pfeffer, 1912) / None.

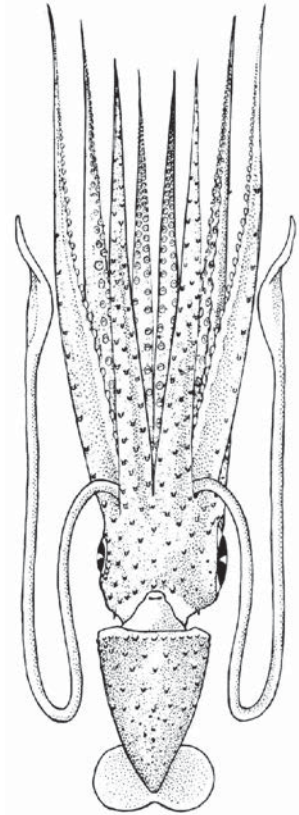
**FAO names:** **En** – Arcturus jewel squid; **Fr** – Loutène de Arcturus; **Sp** – Joyeluria de Arcturus.

**Diagnostic characters:** Suckers of the manus of the tentacle in rows of 5 to 7, with strong dissimilarity in size; dorsal pad of funnel organ sculptured with median ridge down each arm; distal portion of median ridge on arms of dorsal pad funnel organ expanded into distinct flap; outer web conspicuously developed up to depth of 14% of length of longest arm; large atypical light organs not present; **light organs on ventral surface of mantle and head mostly large, no densely set**; 17 large light organs in circle around margin of right eyelid. **No distinct terminal light organs present on arms.**

**Size:** Maximum mantle length 204 mm; mature females 176 to 204 mm, mature males 72 to 125 mm.

**Habitat, biology, and fisheries:** Its biology is poorly known. Occurring from the surface to more than 1 000 m; early juveniles (4 to 5 mm ML) in 0 to 400 m day and night, larger juveniles in 400 to 750 m by day and 0 to 400 m at night; subadults and mature adults in 600 to 2 700 m, mainly deeper than 1 000 m in both midwater and off the bottom. Known predators are *Thunnus obesus* (bigeye tuna), *Xiphias gladius* (swordfish), *Hyperoodon ampullatus* (northern bottlenose whale), *Physeter macrocephalus* (sperm whale) and *Ziphius cavirostris* (Cuvier's beaked whale). Not of interest to fisheries.

**Distribution:** Eastern Atlantic from Gibraltar to about 45°S; western Atlantic from Nova Scotia to Gulf of Mexico and Brazil.



ventral view



***Histioteuthis bonnellii*** (Férussac, 1834)

**Frequent synonyms / misidentifications:** *Histioteuthis bonnellii corpuscula* Clarke, 1880 / None.

**FAO common names:** **En** – Umbrella squid; **Fr** – Loutène bonnet; **Sp** – Joyeluria membranosa.

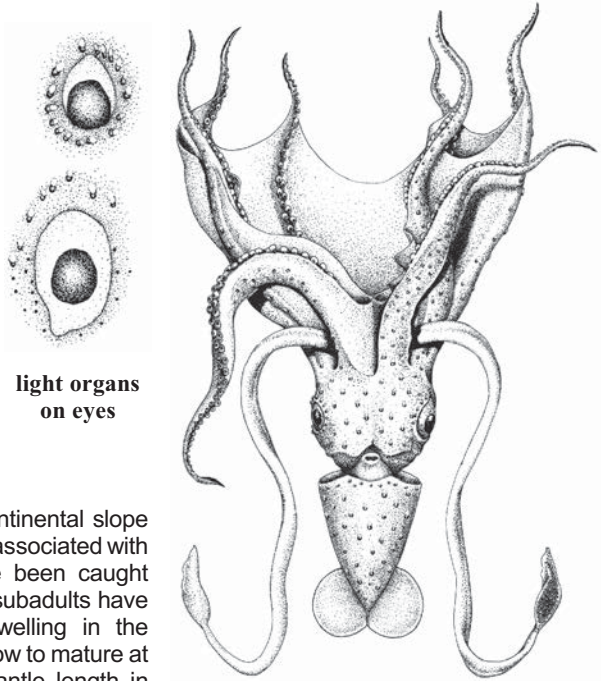
**Diagnostic characters:** Mantle conical, moderately short and stout covered with 7 or 8 diagonal rows of dark elongated light organs on ventral and lateral surfaces, also present on head and arms. **Arms long, about 130 to 300% mantle length, connected by a very broad, deep, maroon-coloured web.** Tentacular club lacking longitudinal cleft on aboral surface; suckers arranged in 6 rows, with those in medial 2 rows enlarged to 2 times diameter of ventral marginal suckers. **Single, elongate, dark, simple light organs present on ends of arms I-IV; 3 longitudinal rows of light organs on basal portions of all arms; a cirlet of 17 (rarely 16 or 18) large light organs around right eye.**

**Size:** Maximum mantle length 330 mm. Total length about 1 300 mm.

**Habitat, biology, and fisheries:** Usually near continental slope and submarine ridges and seamounts, sometimes associated with the bottom. Large juveniles and subadults have been caught between about 200 and 1 000 m depth, but large subadults have been collected at the surface in areas of upwelling in the Mediterranean off Nice and Messina. Males are known to mature at 50 to  $\pm$ 330 mm mantle length (50 to 75 mm mantle length in Atlantic tropical and southern subtropical waters; 172 mm mantle length in northern Mauritanian upwelling; 76 to  $\pm$ 330 mm mantle length in temperate and subarctic waters). Females can mature at about 90 mm mantle length in tropical Atlantic and southern subtropical waters. Mature individuals were taken in the Mauritanian upwelling at depths of 1 300 to 2 200 m. Mature egg diameter measured 2.3 mm in a 330 mm mantle length female from northwestern Atlantic. It seems to be a schooling species. Main predators are sperm whale, *Alepisaurus ferox*, *Aphanopus carbo* and different species of tuna fish. To date this species is of no commercial interest.

**Distribution:** This species is widely, but unevenly, distributed in the Atlantic north of the southern subtropical convergence (SSTC) and extends eastwards across the Indian Ocean and into the Pacific in subtropical waters fringing the convergence of New Zealand and southeastern Australia. Subarctic and north temperate waters, including the Mediterranean Sea. Absent from northern subtropical and western tropical waters and the Gulf of Mexico. Its geographic range in the eastern Atlantic south of temperate waters could be disjunct. In the south Atlantic inhabits in a narrow belt of subtropical waters between 28°S and 40°S that borders the SSTC and extends off Mar del Plata, Argentina eastwards to about 180°.

**Remarks:** This species was divided into 2 subspecies, *Histioteuthis bonnellii bonnellii* and *H. bonnellii corpuscula* by Clarke (1980). Voss *et al.* (1998), in an extensive study of the species, failed to distinguish these 2 nominal subspecies on the base of the characters used by Clarke. However, they suggested that different populations of the species may exist based on differences in spermatophores structure. If future studies confirm this, they suggest that the Atlantic subtropical population be identified to *H. b. corpuscula*.



light organs  
on eyes

ventral view

(all illustrations from Guerra, 1992)

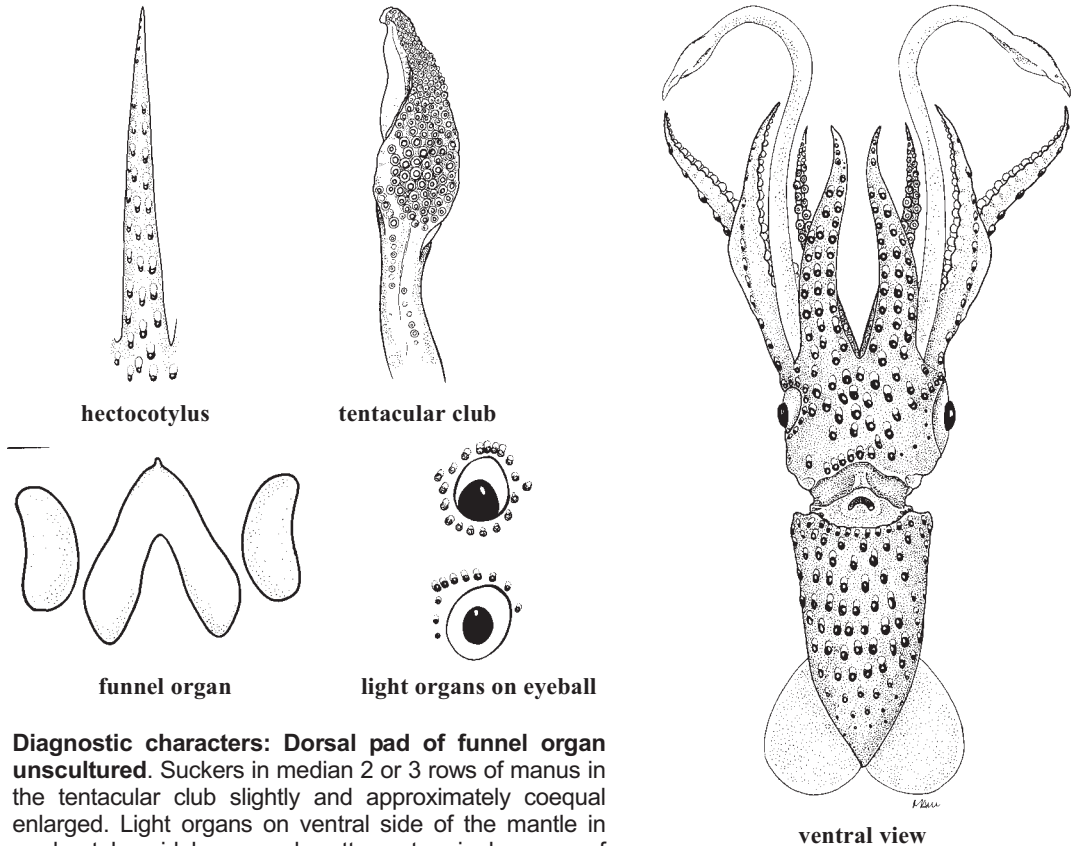




***Histioteuthis celetaria celetaria* (Voss, 1960)**

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

**FAO names:** **En** – Elegant jewel squid; **Fr** – Loutène élégante; **Sp** – Joyeluria elegante.



(all illustrations after Voss, 1969)

**Diagnostic characters:** **Dorsal pad of funnel organ unscultured.** Suckers in median 2 or 3 rows of manus in the tentacular club slightly and approximately coequal enlarged. Light organs on ventral side of the mantle in moderately widely spaced pattern; terminal group of normal light organs on arms I-IV present, except in mature specimens where terminal groups on arms I-III replaced by single, long, narrow, darkly pigmented light organ; **circle around right eye composed of 16 or 17 large light organs; left eye with arch of 7 large light organ over anterior margin, 3 small in ventral margin and a single small on anterodorsal margin.**

**Size:** Maximum mantle length 258 in females and 87 in males.

**Habitat, biology, and fisheries:** Biology poorly known. In both open ocean and near land masses and submarine ridges. Small juveniles (to 39 mm ML) in depths from 0 to 800 m; larger juveniles and adults at 750 to 1 010 m at night; mature animals at 750 to 1 010 m. Mating and spawning probably occurs in deep water. Known predators are *Prionace glauca* (blue shark) and *Alepisaurus ferox* (longnose lancetfish). Not of interest to fisheries.

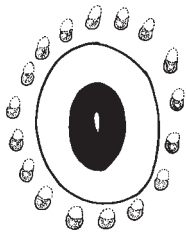
**Distribution:** From Azores and Madeira to 19°S in the east Atlantic; west Atlantic from Nova Scotia to Brazil; present but poorly known in subtropical South Atlantic



***Histioteuthis corona corona* (Voss and Voss, 1962)**

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

**FAO names:** En – Coronate jewel squid; Fr – Loutène couronnée; Sp – Joyeluria coronada.

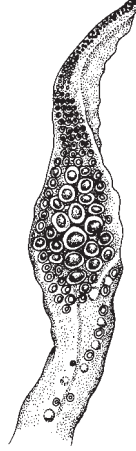


light organs

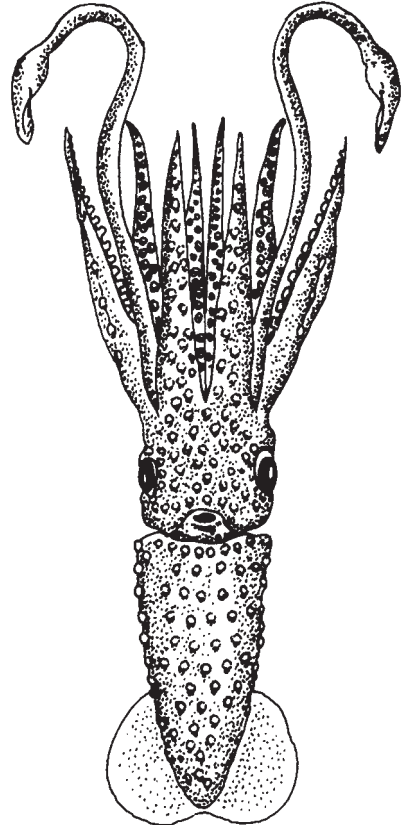
(after Voss, 1969)



hectocotylus



tentacular club



ventral view

**Diagnostic characters:** Dorsal pad of funnel organ unsculptured. Suckers ring on arms IV with 33 to 38 teeth on rings of large suckers of the manus of tentacular club. Light organs on ventral side of the mantle in moderately widely spaced pattern; terminal group of normal light organs on arms absent; circle around right eye composed of 17 (occasionally 16) large light organs; **7 or 8 large light organs in arc over anterior margin of left eye with 3 small light organs on dorsal margin and 4 small ones on ventral margin of eyelid, 2 smaller additional light organs usually on more immediate posteroventral margin.**

**Size:** Maximum mantle length in mature males 188 mm. Maximum mantle length of mature females unknown.

**Habitat, biology, and fisheries:** Data on its biology are very scarce. An oceanic, meso-bathypelagic species. Juveniles (7 to 21 mm ML) in 410 to 700 m by day and 200 to 500 m at night, subadults and adults from 375 to 2 000 m in midwater and at 735 to 750 m near the bottom. Males mature from 110 mm mantle length; female size at maturity unknown. Known predators are *Aphanopus carbo* (black scabbardfish), *Kogia breviceps* (pygmy sperm whale) and *Ziphius cavirostris* (Cuvier's beaked whale). Not of interest to fisheries.

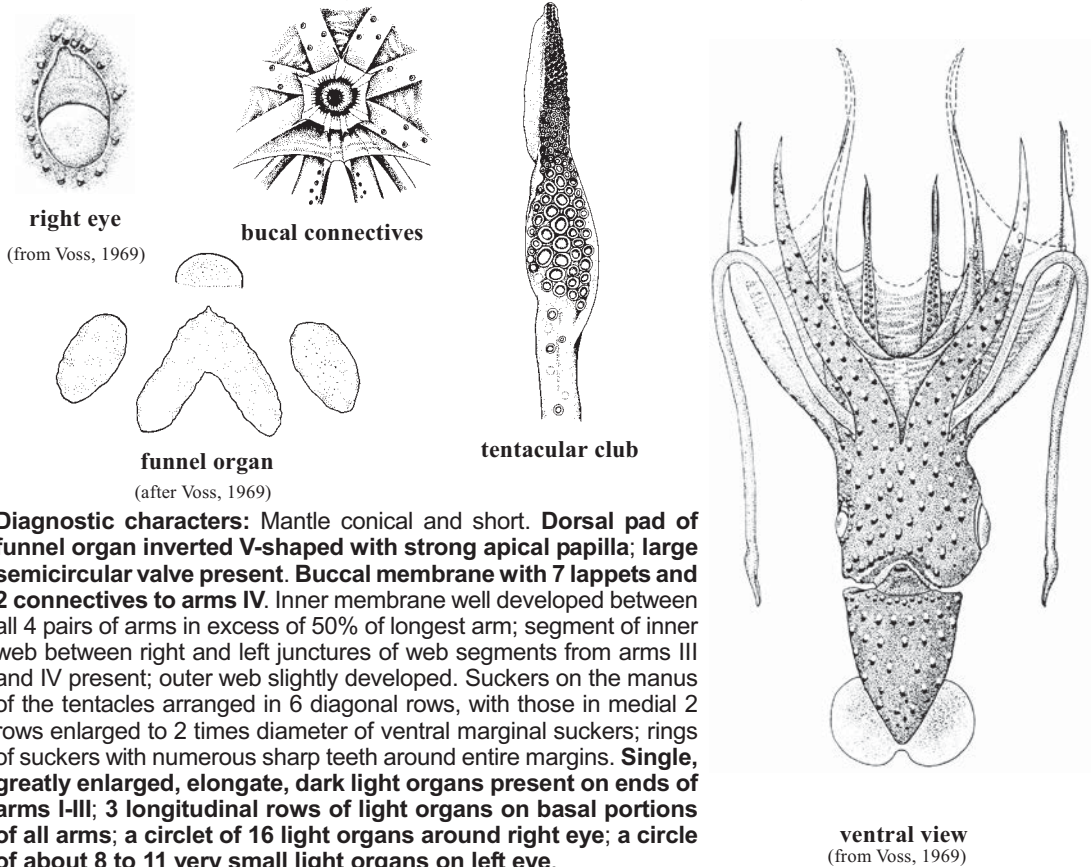
**Distribution:** In the east Atlantic from 46°N to 27°S; in the west Atlantic from approximately 45°N to Uruguay (36°S); Gulf of Mexico.



***Histioteuthis macrohista* Voss, 1969**

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

**FAO names:** **En** – Deep-webbed jewel squid; **Fr** – Loutène ombrelle; **Sp** – Joyeluria umbrelada.



**Diagnostic characters:** Mantle conical and short. **Dorsal pad of funnel organ inverted V-shaped with strong apical papilla; large semicircular valve present. Buccal membrane with 7 lappets and 2 connectives to arms IV.** Inner membrane well developed between all 4 pairs of arms in excess of 50% of longest arm; segment of inner web between right and left junctures of web segments from arms III and IV present; outer web slightly developed. Suckers on the manus of the tentacles arranged in 6 diagonal rows, with those in medial 2 rows enlarged to 2 times diameter of ventral marginal suckers; rings of suckers with numerous sharp teeth around entire margins. **Single, greatly enlarged, elongate, dark light organs present on ends of arms I-III; 3 longitudinal rows of light organs on basal portions of all arms; a cirlet of 16 light organs around right eye; a circle of about 8 to 11 very small light organs on left eye.**

**Size:** Maximum mantle length 65 mm (female).

**Habitat, biology, and fisheries:** Its biology is poorly known. An oceanic, mesopelagic and bathypelagic specie. Occurring from surface to 2 500 m; juveniles and subadults in midwater throughout entire vertical range at night; subadults also near the bottom at 700 to 800 m; mature males at 100 to 600 m at night. Males mature at 40 to 53 mm mantle length, females from about 49 to more than 65 mm. Known predators are *Ommastrephes bartramii* (neon flying squid), *Prionace glauca* (blue shark), *Genypterus blacodes* (ling, pink cusk-eel), *Thunnus albacares* (yellowfin tuna), *Thunnus obesus* (bigeye tuna), *Arctocephalus gazella* (Antarctic fur seal), *Physeter catodon* (sperm whale), *Diomedea exulans* (wandering albatross), *Phoebetria fusca* (sooty albatross) and *Puffinus tenuirostris* (short-tailed shearwater). Not of interest to fisheries.

**Distribution:** Almost circumglobal, primarily in the transitional and fringing waters of the Southern Subtropical Convergence, between about 33° and 47°S, extending northward in the eastern Atlantic to 23°S and probably further north off Namibia. Recorded once in the Gulf of Guinea.



***Histioteuthis meleagroteuthis* (Chun, 1910)**

**Frequent synonyms / misidentifications:** *Meleagroteuthis separata* Sasaki, 1915; *Histioteuthis bruuni* Voss, 1969 / None.

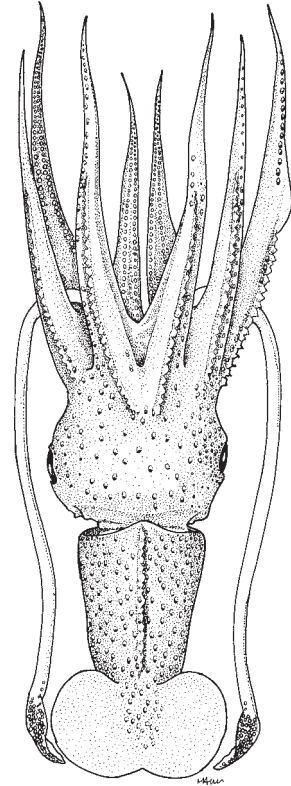
**FAO names:** En – Pearly jewel squid; Fr – Loutène nacrée; Sp – Joyeluria nacarada.

**Diagnostic characters:** Midline of dorsal surface of mantle with row of small tubercles fused basally to form strong ridge on anterior two-thirds of mantle and from near base to approximately middle portion of arms I-III; light organs uniformly small, arranged in dense pattern on ventral surfaces of mantle and head, in 8 or 9 longitudinal rows on basal portions of arms IV, in circlet of 19 to 22 around right eye.

**Size:** Maximum mantle length 114 mm.

**Habitat, biology, and fisheries:** Its biology is practically unknown. Found from surface to more than 1 000 m; juveniles (<6 mm ML) at 210 to 300 m by day, juvenile (16 mm ML) and subadult (54 mm ML) at 610 to 700 m, juveniles (25 to 35 mm ML) at 100 to 360 m by night; large juveniles and subadults in midwater about 200 to 1 950 m and near the bottom at about 500 to 1 250 m. Females mature at 114 mm mantle length, males at 65 to 102 mm. Large females could undergo diel vertical migration and spawning may occur in deep water. Known predators are *Galeocerdo cuvieri* (tiger shark), *Thunnus obesus* (bigeye tuna), *Globicephala macrorhynchus* (short-finned pilot whale), *Hyperoodon ampullatus* (northern bottlenose whale), *Physeter catodon* (sperm whale), *Ziphius cavirostris* (Cuvier's beaked whale), *Phoebetria fusca* and *P. palpebrata* (sooty albatrosses). Not of interest to fisheries.

**Distribution:** Madeira, Canaries, Mauritania, Guinea Bissau, Gulf of Guinea, Gabon, off Namibia; western Indian Ocean and western and central Pacific.



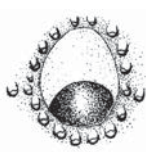
**dorsal view**  
(after Voss, 1969)



***Histioteuthis reversa*** (Verrill, 1880)

**Frequent synonyms / misidentifications:** *Histioteuthis elongata* (Voss and Voss, 1962) / None.

**FAO names:** En – Reverse jewel squid; Fr – Loutène retournée; Sp – Joyeluria invertida.



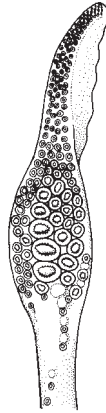
right eye



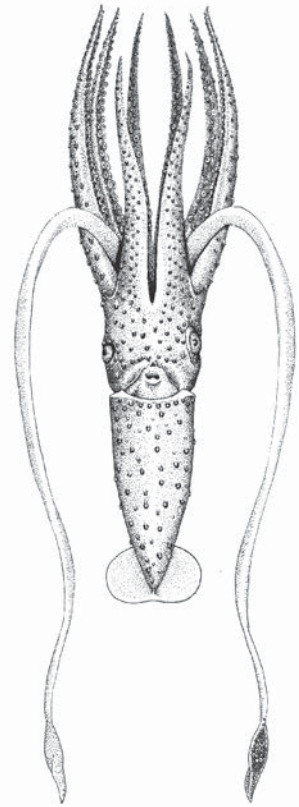
left eye

light organs on eyeball

(from Guerra, 1992)



tentacular club



ventral view

(from Guerra, 1992)

**Diagnostic characters:** Mantle conical moderately elongated. Inner web low to vestigial between dorsal 3 pairs of arms, outer web not conspicuously developed. Tentacular suckers in about 6 diagonal rows, the medial rows enlarged especially central 4 or 5 of more ventral of 2 rows. **Eighteen light organs, 17 large and 1 small, in closed cirlet around right eye; 7 large light organs in arc over anterior margin of left eye with 10 to 14 small light organs regularly spaced around remaining margin of eyelid.**

**Size:** Maximum mantle length 200 mm (female).

**Habitat, biology, and fisheries:** Data on its biology are very scarce. Juveniles at 0 to 630 m by day and 0 to 260 m at night; subadults at 80 to 300 m at night; mature females at 500 to 1 000 m by day; mature males and females in midwater at 800 to 1 000 m by day and in midwater and near the bottom at 600 to 1 300 m at night. Females mature at 114 to 186 mm mantle length and undergo rapid elongation of the mantle shortly before reaching maturity; mature females ascend the water column to spawn and die in shallow water. Males mature at about 49 to 99 mm mantle length. Abundant near slopes and submarine ridges; 46 to 370 km from shore off Namibia; Known predators are *Aristaeomorpha foliacea* (giant red shrimp), *Etmopterus spinax* (velvet belly), *Galeus melastomus* (blackmouth catshark), *Prionace glauca* (blue shark), *Xiphias gladius* (swordfish), *Globicephala melas* (long-finned pilot whale), *Grampus griseus* (Risso's dolphin), *Hyperoodon ampullatus* (northern bottlenosed whale), *Kogia breviceps* (pygmy sperm whale), *Stenella coeruleoalba* (striped dolphin) and *Ziphius cavirostris* (Cuvier's beaked whale). Not of interest to fisheries.

**Distribution:** Mediterranean Sea. Widely distributed in the temperate eastern Atlantic from 60°N to approximately 23°S; abundant in Mauritanian upwelling region, ranging southward to Namibia and South African west coast, and east to 35°S 23°E and 44°S 26°E; northwestern Atlantic from subarctic (±52°N) to Suriname. Apparently absent from the Gulf of Mexico, Caribbean Sea and South Atlantic Central water mass.



## JOUBINITEUTHIDAE

### Joubin's squids

This monotypic family contains a single species. Consequently, diagnostic characters, habitat, biology and interest to fisheries coincide.

#### *Joubiniteuthis portieri* (Joubin, 1916)

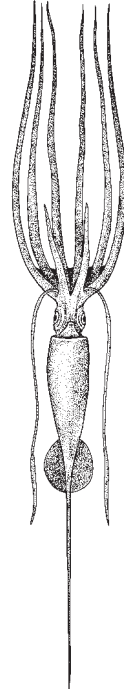
**Frequent synonyms / misidentifications:** *Valdemaria danae* Joubin, 1931 / None.

**FAO names:** **En** – Joubin's squid; **Fr** – Loutène de Joubin; **Sp** – Luria de Joubin.

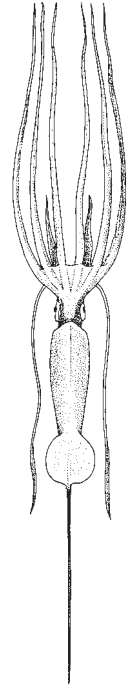
**Diagnostic characters:** Mantle long and slender. Extremely long, slender tail, slightly longer than mantle length. **Arms very long (greater than 2 times ML), slender and whip-like**; suckers are biserially arranged at the bases of arms I-III, but they increase to 4, then 6, often irregularly arranged rows until the tips; **ventral arms short** (length one-third or less than length of other arms) **with suckers in 4 series**; arms joined by low web. Tentacles much thinner than arms; **tentacular club laterally compressed**; **bears suckers in 5 to 12 series**. Funnel locking apparatus with oval depression. Light organs absent.



tentacular club



ventral view

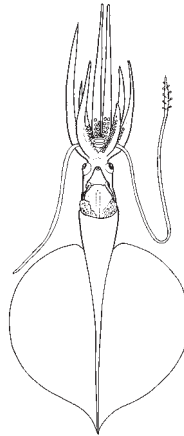


dorsal view

(after Roper & Young, 1969)

#### Similar families occurring in the area

Squids of the family Magnapinnidae have recently been videotaped in deep water (greater than 1 000 m) worldwide. These squid have extremely long arms and could be confused with joubiniteuthids. However, the fins are very large and all arms are extremely long and the tentacles are practically indistinguishable from the arms, making the magnapinnid squids appear to have 10 identical arms.



dorsal view

Magnapinnidae

**Size:** Up to 105 mm mantle length.

#### **Habitat, biology, and fisheries:**

Oceanic, meso- to bathypelagic squids. All specimens captured in open nets from the surface to 3 500 m. Little is known about the biology of this species, which is represented by few specimens. Not of interest to fisheries.

**Distribution:** Circumglobally in tropical and subtropical waters.



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## LEPIDOTEUTHIDAE

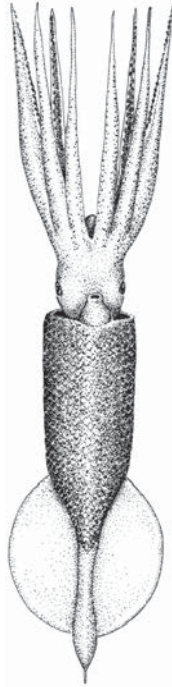
### Soft-scaled squids

This monotypic family contains a single species. Consequently, diagnostic characters, habitat, biology and interest to fisheries coincide.

*Lepidoteuthis grimaldii* Joubin, 1895

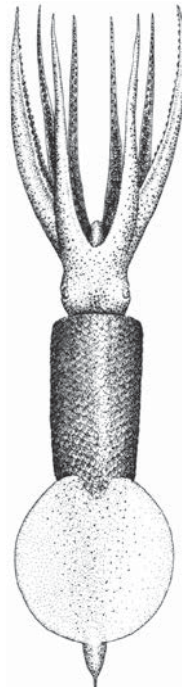
**Frequent synonyms / misidentifications:** None / None

**FAO names:** **En** – Grimaldi's soft-scaled squid; **Fr** – Loutène écaillé-doux de Grimaldi; **Sp** – Luria escamuda blanda de Grimaldi.



ventral view

(after Guerra, 1992)



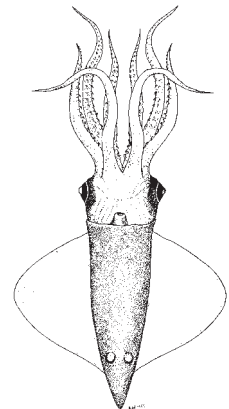
dorsal view

**Diagnostic characters:** Mantle mostly covered with dermal cushions (= 'scales'). Tentacles absent in subadults and adults, greatly reduced in juveniles. Arm suckers in 2 rows, some of them enlarged in males, which are equipped with a pair of grossly enlarged sabre-like hooks. Fins large and terminal. Light organs absent.

#### Similar families occurring in the area

Octopoteuthidae: lacks dermal cushions.

**Size:** Maximum mantle length 1 000 mm, weight  $\pm 11$  kg, estimated from beaks; maximum recorded female mantle length 970 mm; male mantle length 422 mm; at maturity females attain twice the size of males.



Octopoteuthidae



**Habitat, biology, and fisheries:** This squid is rarely captured and little is known of its biology. Tropical and subtropical cosmopolitan, mesopelagic, bathyal and demersal. Collected in depths of 0 to 1 100 m; paralarvae and juveniles at 0 to 700 m at night, 0 to 585 m by day. The paralarvae reaches a rather large size (at least 10 mm ML). Large, thick tentacles are present in the paralarvae but they are lost during the early subadult stage. Until very recently, adults were known only from stomachs of predators, mainly the sperm whales; also known from stomachs of *Grampus griseus* (Risso's dolphin), *Aphanopus carbo* (black scabbardfish), a tuna (*Tunnus obesus*), *Alepisaurus ferox* (longnose lancetfish) and *Diomedea exulans* (wandering albatross). No interest to fisheries.

**Distribution:** Madeira, Canary Islands; northwestern Atlantic from Bermuda and Nova Scotia, northeastern Atlantic from Ireland to Spain and the Azores; western, central and eastern South Atlantic; South Georgia; southern Indian Ocean, western, central and eastern Pacific, south Tasmania.



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**LYCOTEUTHIDAE**

**Firefly squids**

**Diagnostic characters:** Mostly small, muscular squids. **Suckers present** on arms and clubs, **hooks absent**. **Four or 5 oval light organs on ventral surface of eyeball (ocular photophores)**. **Visceral light organs: anal, branchial and postero-abdominal organs.** Spherical light organs **embedded in tentacles**.

**Habitat, biology, and fisheries:** Occurring from the surface to 3 300 m. Occupying mesopelagic depths during the day and migrating into near-surface waters at night. They are mainly tropical and subtropical in distribution. They possess a large variety of luminous organs. Strong sexual dimorphism in general morphology occurs in some species.

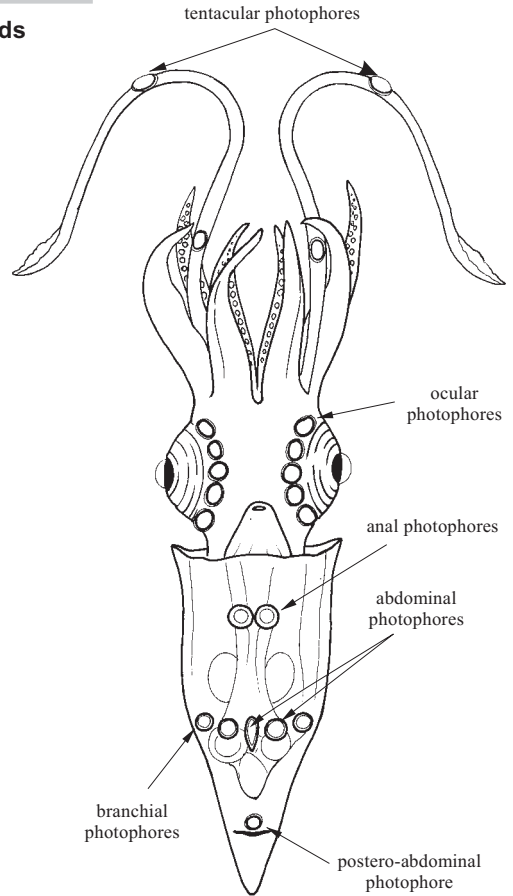
**Remarks:** Two subfamilies are recognized, the Lycoteuthinae and the Lampadioteuthinae.

**Similar families occurring in the area**

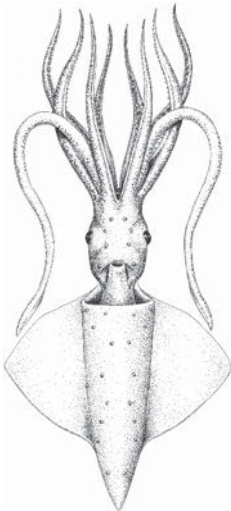
**Ancistrocheiridae:** lack light organs on the eyeballs and have large light organs on the ventral surfaces of the head and mantle.

**Octopoteuthidae:** lack tentacles.

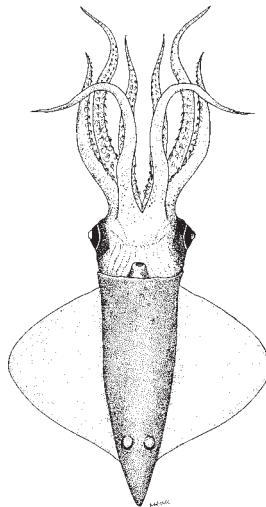
**Pyroteuthidae:** have hooks on arms.



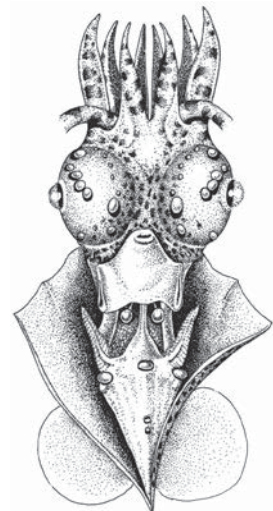
**ventral view**



**Ancistrocheiridae**  
(after Guerra, 1992)



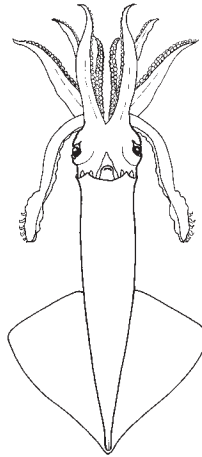
**Octopoteuthidae**



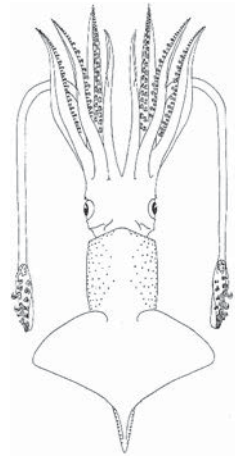
**Pyroteuthidae**  
(after Guerra, 1992)

Onychoteuthidae: have hooks on tentacular clubs.

Enoploteuthidae: have hooks on arms; have light organs on ventral surfaces of head and mantle.



Onychoteuthidae




Enoploteuthidae

#### Key to the species of Lycoteuthidae occurring in the area


- 1a. Four ocular light organs and 5 light organs in mantle cavity . . . . . *Lampadioteuthis megaleia*  
 1b. Five ocular light organs and 10 light organs in mantle cavity . . . . . → 2
- 2a. No spherical tail light organ located between fins . . . . . *Lycoteuthis lorigera*  
 2b. Spherical tail light organ present at end of mantle, projecting beyond fins . *Selenoteuthis scintillans*

#### List of species occurring in the area

The symbol  is given when species accounts are included.

 *Lampadioteuthis megaleia* Berry, 1916.

 *Lycoteuthis lorigera* (Steenstrup, 1875).

 *Selenoteuthis scintillans* Voss, 1959

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***Lampadioteuthis megaleia* Berry, 1916**

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

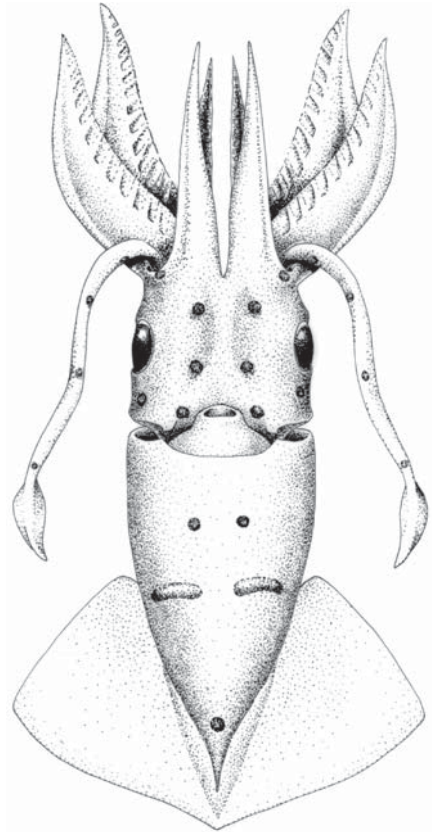
**FAO names:** **En** – Wonderful firefly squid;  
**Fr** – Encornet luciole merveilleux; **Sp** – Lucernaluria maravillosa.

**Diagnostic characters:** **Four ocular photophores present:** 3 ventral in a line, 1 lateral, all 4 set far apart. **One light organ on base** of each tentacle and **4 on stalks.** **Five light organs inside the mantle cavity:** 2 anal, 2 branchial and 1 posterior. **No light organs** on mantle, head and arms. **Male genitalia organs unpaired.** **Right ventral arm hectocotylized.**

**Size:** Maximum mantle length 40 mm.

**Habitat, biology, and fisheries:** Its biology is practically unknown. Pelagic and oceanic species. Occurring at depths from 50 to 290 m by day, 0 to 200 m at night. Not of interest to fisheries.

**Distribution:** Portugal, Morocco to Cape Verde Islands; northwestern Atlantic at the periphery of Sargasso Sea; southwestern Pacific.



ventral view (from Guerra, 1992)



***Lycoteuthis lorigera* (Steenstrup, 1875)**

**Frequent synonyms / misidentifications:** *Lycoteuthis diadema* (Chun, 1900) / None.

**FAO names:** **En** – Crowned firefly squid; **Fr** – Encornet luciole couronné; **Sp** – Luciernaluria coronada.

**Diagnostic characters:** Five light organs on ventral side of eyeball, arranged in 1 row. Tentacular stalk **with 2 light organs** and mantle cavity **with 8 to 10 luminous organs**. Arm tips without globular light organs, attenuated in adults. **In adult males** (mantle length above 80 to 90 mm) **the dorsolateral (II) arms are very elongated** and **attenuated** into spidery whip (sometimes twice exceeding the mantle length) devoid of suckers and bearing many light organs along the base of the swimming membrane (lateral keel) over the entire arm length; in young squids they are normal, without light organs. **Posterior abdominal photophores fused into a single organ**. **Male genitalia organs paired**; hectocotylus absent.

**Size:** Maximum mantle length 190 mm (mature male).

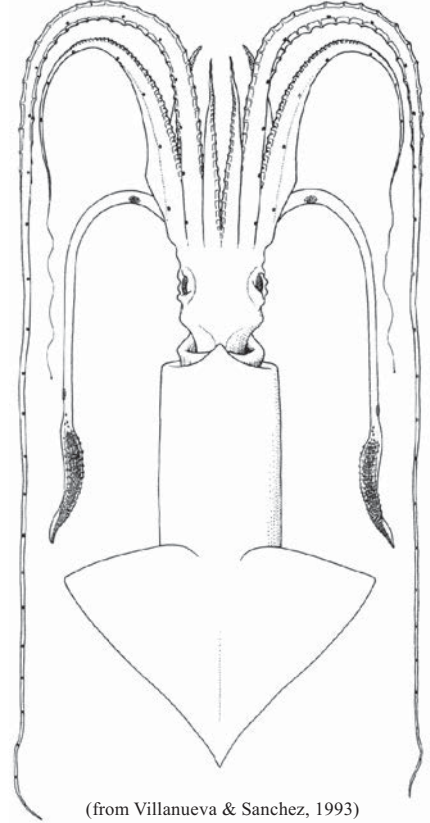
**Habitat, biology, and fisheries:** Bathyal, mesopelagic species, probably does not ascend into the pelagic zone in large numbers but forms aggregations at 500 to 1 000. Found from the surface to 3 000 m. Known predators are *Holohalaelurus regani* (Izak catshark), *Merluccius capensis* (Cape hake), *M. paradoxus* (deepwater Cape hake), *Thunnus albacares* (yellowfin tuna), *T. maccoyii* (southern bluefin tuna), *Procellaria parkinsoni* (petrel), *Arctocephalus pusillus* (Cape fur seal), *Globicephala melas* (long-finned pilot whale), *Kogia breviceps*, (pygmy sperm whale), *K. simus* (dwarf sperm whale), *Mirounga leonina* (southern elephant seal), *Orcinus orca* (killer whale) and *Physeter catodon* (sperm whale). Not of interest to fisheries.

**Distribution:** Central South Atlantic: off Brazil and Argentina; off Namibia and South African west coast. Pacific Ocean: South of Australia, eastern Tasmania and New Zealand.

**Remarks:** The long-used name for this species, familiar to most teuthologists even currently, was *Lycoteuthis diadema* (Chun, 1900). This species was designated a junior synonym to *L. lorigera* (Steenstrup, 1875) by Villanueva and Sanchez (1993: 31). Females of this species are indistinguishable from those of *L. springeri* (a species described from the Gulf of Mexico) except for a single large photophore in the musculature of the apex of the fins slightly dorsoposteriorly to the convex surface of the conus of the gladius, present in both sexes of *L. springeri* but absent in both sexes of *L. lorigera*.



right arm III



(from Villanueva & Sanchez, 1993)

dorsal view (male)



***Selenoteuthis scintillans* Voss, 1958**

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

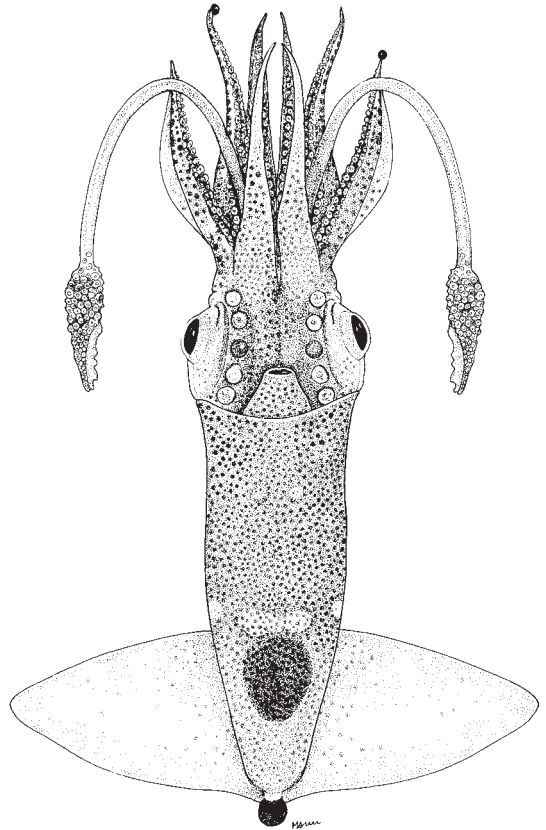
**FAO names:** **En** – Shining firefly squid; **Fr** – Encornet luciole scintillant; **Sp** – Lucernaluria centelleante.

**Diagnostic characters:** Five light organs on ventral side of eyeball, arranged in 1 row. Tentacular stalk with 3 light organs and mantle cavity with 8 to 10 luminous organs. Arm tips without globular light organs, not attenuated. **Single globular light organ on tip of each II and III arms** in mature males, which are absent in females. **One large and globular light organ on the posterior end of the body.** Male genitalia organs paired; hectocotylus absent.

**Size:** Maximum mantle length 45 mm

**Habitat, biology, and fisheries:** Tropical-subtropical Atlantic in the lower mesopelagic to upper bathypelagic, migrating diurnally to the epipelagic at night (0 to 3 290 m, 0 to 770 m by day, 0 to 154 m at night). Known predators are *Globicephala macrorhynchus* (short-finned pilot whale) and *G. melas* (long-finned pilot whale). Not of interest to fisheries.

**Distribution:** Tropical and subtropical western and eastern North Atlantic Ocean, Caribbean Sea, and Gulf of Mexico. Records of confidence off Morocco and Canary Islands.



ventral view



## MAGNAPINNIDAE

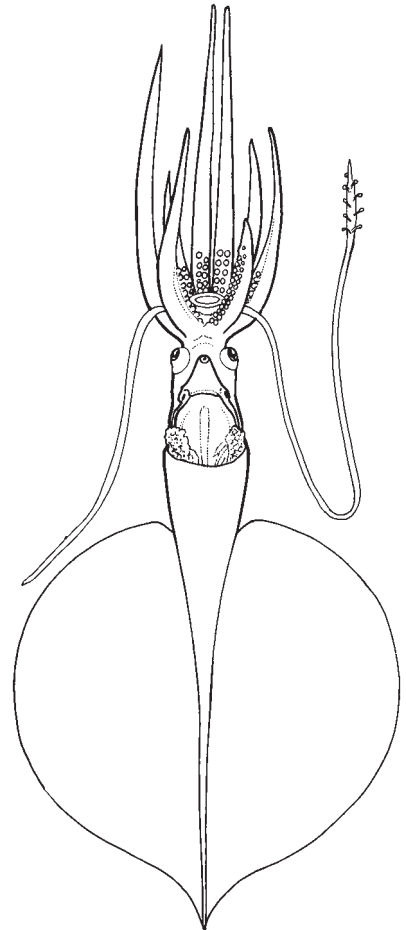
### Bigfin squids

**Diagnostic characters:** Rough estimates from videos indicate total lengths up to 7 m. Eyes large. Head short without distinct neck or brachial pillar. **Fins terminal and very large, about 70 to 90% of mantle length.** Muscular mantle restricted to the anterior 10 to 15% of the sessile region (fins without the free anterior fin lobes) of the fins. Short tail usually present. **Arms with 2 regions: short, proximal-arms with large suckers and long, very slender distal-arms covered with minute suckers. Arms suckers with bi- to quadriserial suckers on proximal-arms. Tentacles with 2 regions: short, proximal-tentacles that may or may not bear numerous suckers and long, very slender distal-tentacles covered with numerous minute suckers.** Tentacles without keels, pads or locking apparatuses. **Arms and tentacles are approximately equal in thickness and length.** Buccal connectives attach to ventral margins of arms IV. Funnel with oval locking-apparatus without tragus or antitragus. Photophores absent.

**Habitat, biology, and fisheries:** This seems a cosmopolitan family; specimens were recorded in the eastern Atlantic, off Africa (3°40'N to 2°30'W); in the western Atlantic, off Brazil and the Gulf of Mexico; in the Indian Ocean and in the central Pacific. Very little is known about the biology of this bathypelagic family, occurring between depths of 1 940 and 4 735 m. Most described specimens are based on paralarvae or juveniles. The adult and subadult squids, observed from submersibles or ROVs, have the following features: the arms and tentacles typically are held in an unusual position: they extend at sharp angles to the body axis then abruptly (sometimes at a 90° angle) turn anteriorly. The “elbow” is, roughly, two-thirds of the length of the mantle away from the body axis. The tentacles are usually not easily recognizable in videos; the arms and tentacles, therefore, appear as 10 equal appendages. Length of the arms/tentacles of the squid are about 10 to 20 times the mantle length although they are highly contractile. It was estimated the fin length of their specimen at about two-thirds of the mantle length. Not of interest to fisheries.

#### Species occurring in the area

The family Magnapinnidae was originally based on a single species, *Magnapinna pacifica* Vecchione and Young, 1998. However, the discovery of a second species, *M. atlantica* Vecchione and Young, 2006, and the understanding that other known specimens and species belong in the family indicate that this poorly known deep-sea family may have as many as 5 species based on only 11 specimens (Vecchione and Young, 2013). Two of the species are well-described and 4 of them are weakly separated from one another. At present, only *M. talismani* can be reported from the area. Therefore, and until more information is acquired, the other specimens filmed off Africa remain *Magnapinna* sp.




ventral view




### Similar families occurring in the area

Based on similarity, this family seems to be closely related to the group known as “chiroteuthid families”. These families include the Chiroteuthidae, Mastigoteuthidae, Joubiniteuthidae, Batoteuthidae and Promachoteuthidae (Vecchione and Young, 2008). Of these, only the first 3 families were recorded in the area. Magnapinnidae differs from them in the following characters: narrow, very elongate (filiform) distal-arms and distal-tentacles; very large fins; relative length of the arms/tentacles, which is far greater than in any other squid.

### List of species occurring in the area

The symbol  is given when species accounts are included.

 *Magnapinna talismani* (Fischer and Joubin, 1907)

### References

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***Magnapinna talismani*** (Fischer and Joubin, 1907)

**Frequent synonyms / misidentifications:** *Mastigoteuthis talismani* Fischer and Joubin, 1907 / None.

**FAO names:** **En** – Talisman bigfin squid; **Fr** – Encornet ailé du Talisman; **Sp** – Luria alada del Talisman.

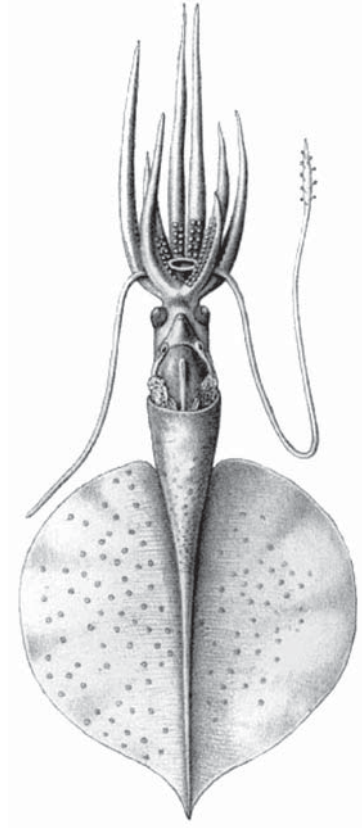
**Diagnostic characters:** **Fin length 90% mantle length.** Ventral surface of fins covered with white nodules. Funnel locking apparatus with oval depression and possible tragus. Suckers on proximal-arm in 2 series and closely packed. Proximal-arm suckers with smooth inner rings. Tentacles long, thin and cylindrical; much thinner than the arms at their base; no evidence of a discreet club is present; no distinct transition between proximal- and distal-tentacle; distal-tentacle apparently with numerous, small suckers.

**Size:** Maximum mantle length 61 mm.

**Habitat, biology, and fisheries:** Very rare bathypelagic squids. Caught in open bottom trawl to a depth of 3 175 m. Not of interest to fisheries.

**Distribution:** Tropical and northern subtropical Atlantic: area off the Azores and Cape Verde Islands.

**Remarks:** *Mastigoteuthis talismani* was placed in *Magnapinna* (family Magnapinnidae) by Vecchione and Young (2006).



**ventral view**  
(from Fischer & Joubin, 1907)



## MASTIGOTEUTHIDAE

### Whiplash squids

**Diagnostic characters:** Fins large (about 50% of ML) to very large (about 90% of ML) and in terminal position. Short tail present (often absent due to damage during capture). **Arms IV longest**, thickest and with expanded lateral membranes. **Funnel locking apparatus oval**, usually with knobs (tragus, antitragus) affecting the shape of the depression in the funnel component in different species; specific shape varies with species. The **tentacles are elongate and whip-like** with tentacular clubs that are **little differentiated from the tentacular stalks** except that they are covered with thousands of extremely small suckers in numerous (30 or more) irregular series. **Light organs present on eyeball or eyelid and /or skin integument or absent**. Weakly muscled and reddish in colour.

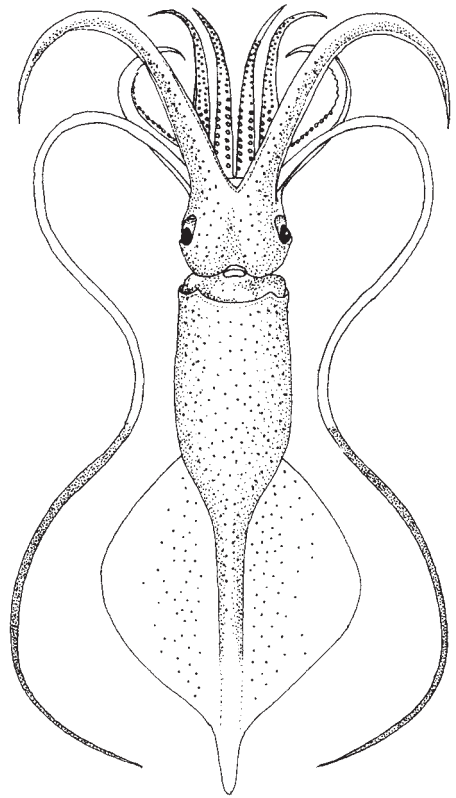
**Habitat, biology, and fisheries:** Deepwater pelagic and benthopelagic. The biology of all the species of this family is very poorly known. Some species have been observed from submersibles drifting just above the ocean floor and dangling tentacles within a few millimetres of the bottom, presumably, to capture copepods and other small components of the epibenthic zooplankton. Vesiculate tissue in the squid, especially in the ventral arms, reduces negative buoyancy. Complex actions of large fins maintain the head-down posture in spite of the concentration of buoyant tissue at the anterior end. None of the species have interest to fisheries.

**Remarks:** This family is among the most taxonomically confused families of all deepsea squid mainly because many characters are based on the tentacles and light organs, structures often lost and abraded during capture. For these reasons, it is difficult to distinguish between species. Several genera and subgenera have been erected for various entities of mastigoteuthids, and the systematics of the family has been in a state of flux for many years. Because the family includes many poorly known species that cannot be confidently divided at the generic level, yet we, here, recognize only the single genus *Mastigoteuthis*, in agreement with Vecchione *et al.* (2007) and Roper and Jereb (2010).

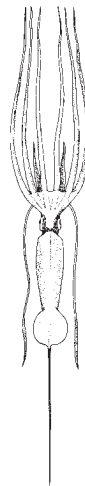
#### Similar families present in the area

Chiroteuthidae: tentacle suckers usually in 4 series or absent.

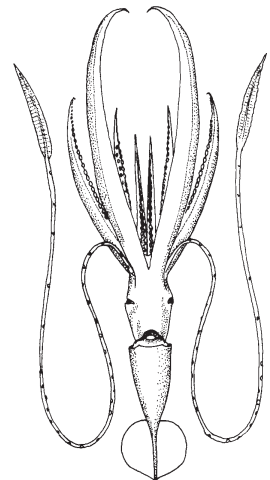
Joubiniteuthidae: tentacles are distinguishable from the arms and possesses slender needle-like tail.



ventral view



dorsal view  
Joubiniteuthidae









ventral view  
Chiroteuthidae

**Key to the species of Mastigoteuthidae occurring in the area**

- 1a. No light organs on ventral side of eyeball . . . . . → 2  
 1b. Two large light organs on ventral side of eyeball . . . . . ***Mastigoteuthis hjorti***
- 2a. Numerous small integumental black light organs surrounded by a light ring scattered over surface of body, especially on ventral side; arms sucker rings smooth or with a few slightly obtuse teeth . . . . . → 3  
 2b. Body surface devoid of light organs . . . . . ***Mastigoteuthis agassizii***
- 3a. Arm sucker rings without teeth; no funnel pockets . . . . . → 4  
 3b. Arms sucker rings with teeth; with funnel pockets . . . . . ***Mastigoteuthis glaukopsis***
- 4a. Skin without tubercles . . . . . ***Mastigoteuthis magna***  
 4b. Mantle and other skin, except fins, covered with small tubercle . . . . . ***Mastigoteuthis danae***

**List of species occurring in the area**

The symbol  is given when species accounts are included.

-  *Mastigoteuthis agassizii* Verrill, 1881.  
 *Mastigoteuthis danae* (Joubin, 1933).  
 *Mastigoteuthis glaukopsis* Chun 1908.  
 *Mastigoteuthis hjorti* Chun, 1913.  
 *Mastigoteuthis magna* Joubin, 1913.

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***Mastigoteuthis agassizii* Verrill, 1881**

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

**FAO names:** **En** – Agassizi's whiplash squid; **Fr** – Loutène filamentoux de Agassizi; **Sp** – Flageloluria de Agassizi.

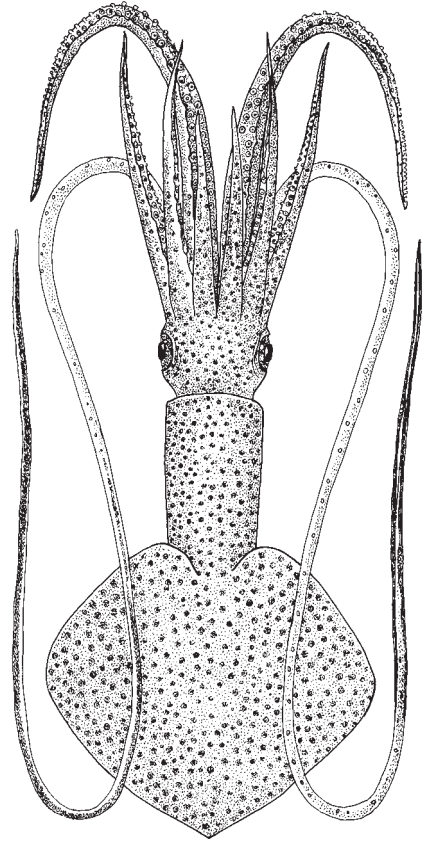
**Diagnostic characters:** Tubercles absent from mantle and other skin integument. **Fin length 67% mantle length.** Arm suckers with oblique apertures on inner rings and smooth inner margins. Tentacular club covers half of tentacle length; club base with scattered suckers mostly in 2 series for some distance; club suckers with circular aperture often with 2 or 3 teeth on one side. Integumental light organs on dorsal and ventral mantle, dorsal fin, head and arms; a small light organ inside on eyelid.

**Size:** Maximum mantle length 100 mm.

**Habitat, biology, and fisheries:** The only recorded prey items were crustaceans and predator was *Alepisaurus ferox* (lancetfish). Captured in open nets in 900 to 3 557 m. Not of interest to fisheries.

**Distribution:** Madeira and southwest of Tenerife; northwestern Atlantic.

**Remarks:** Another form has been described from the area, that cannot be separated with certainty from *Mastigoteuthis agassizii* at present (Vecchione and Young 2007): *M. grimaldii* Joubin, 1895, the original description of which was based on a damaged 38 mm ML specimen, caught near the Azores. This is considered of incertus status at present, but may prove to be a distinct species as well as a synonym of *M. agassizii* in the future.



**dorsal view**

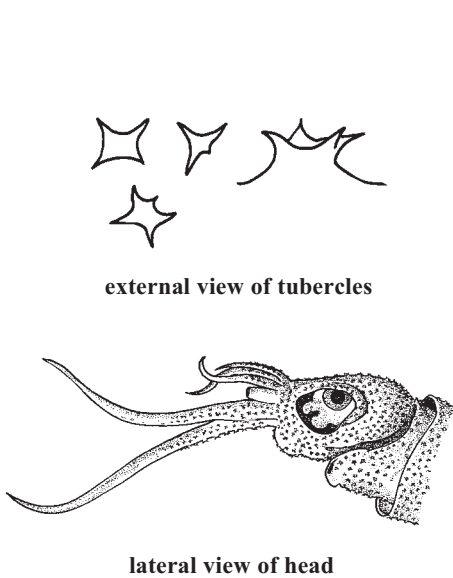
(after Okutani, 2005)



***Mastigoteuthis danae* (Joubin, 1933)**

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

**FAO names:** **En** – Dana's whiplash squid; **Fr** – Loutène filamentoux de Dana; **Sp** – Flageloluria de Dana.



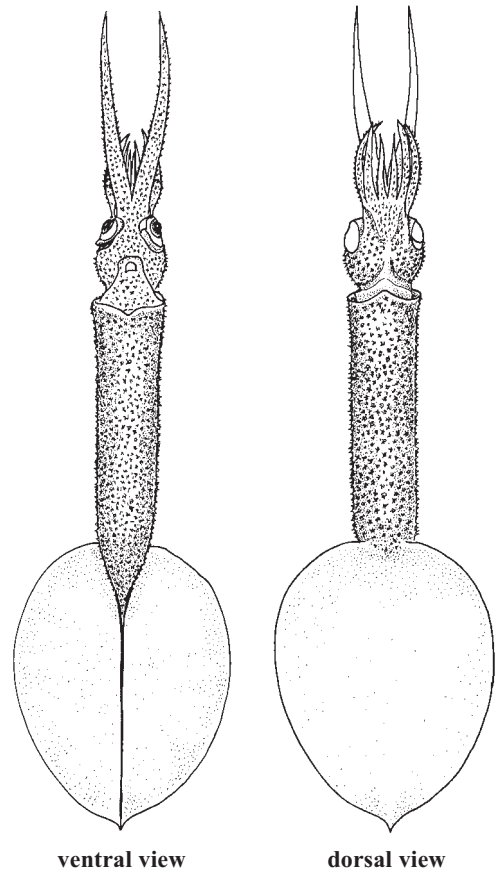
(all illustrations after Vechione, Young & Salcedo-Vargas, 2004)

**Diagnostic characters:** Mantle and other skin, except fins, covered with small, cartilaginous stellate tubercles. Funnel locking apparatus with a very large tragus and a distinct antitragus. Arm suckers without teeth. Tentacles stalk about 2 mm in length and slender; club enlarged in diameter, about 7 mm long; club tip slender, about 3 mm long, with sucker buds. Light organs absent.

**Size:** Maximum mantle length 30 mm.

**Habitat, biology, and fisheries:** Occurring at depths of 60 to 2 680 m, 100 to 298 m at night. Not of interest to fisheries.

**Distribution:** Canary islands, Cape Verde; Azores, Bermuda, Antilles; northwestern Indian Ocean.



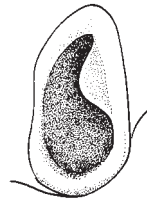
***Mastigoteuthis glaukopis* Chun, 1908**

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

**FAO names:** **En** – Glaucous / Blue whiplash squid; **Fr** – Loutène filamentoux glauque; **Sp** – Flageloluria glauca.



tentacular club



funnel-locking apparatus

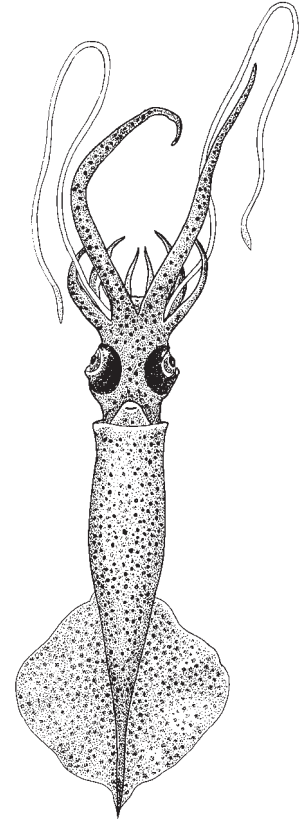
(all illustrations after Chun, 1910)

**Diagnostic characters:** Tubercles absent from mantle and elsewhere. Fin length about half of mantle length; fins nearly rhomboidal in shape. Eyes large (15% of ML); occupy most of head. **Arm suckers with blunt, conical teeth around opening, with 5 to 7 slightly larger teeth distally.** Funnel-locking apparatus with tragus but no antitragus. Tentacular club not wider than stalk; club 70% of tentacle length; club with indistinct undulating protective membrane; proximally club with very small, scattered suckers; club then widens to occupy half the tentacle surface; distally club extends to leave only about one-third of circumference bare with suckers situated close together, nearly touching one another; club suckers become slightly larger distally except near tip; club suckers with 10 to 12 small teeth at approximately regular intervals around inner ring. Integumental light organs absent; eyelid light organ present. Vivid reddish brown colour.

**Size:** Maximum mantle length 112 mm.

**Habitat, biology, and fisheries:** Bathypelagic. Found at depths between 500 and 1 000 m. Not of interest to fisheries

**Distribution:** Madeira; northwest Indian Ocean; western Indian Ocean and Flores Sea; Indo-Pacific.



ventral view

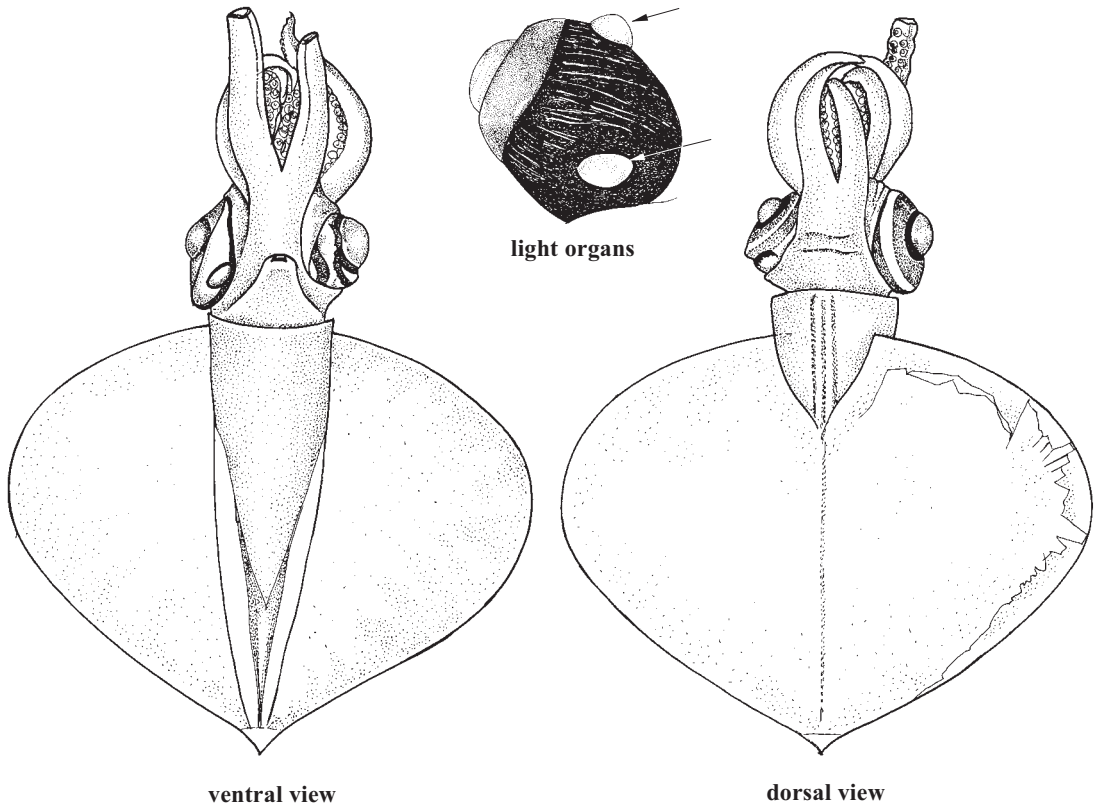




***Mastigoteuthis hjorti* Chun, 1913**

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

**FAO names:** En – Hjort's whiplash squid; Fr – Loutène filamentoux de Hjort; Sp – Flageloluria de Hjort.



**Diagnostic characters:** Large tubercles cover mantle, head, funnel and aboral surface of arms in subadults (tubercles are often lost during capture). Fins large, nearly the full length of the mantle. Funnel locking apparatus with oval, slightly curved depression, posterolateral sides protrude; without tragus or antitragus; depression undercuts posterior margin. **Two large circular light organs on ventral surface of eyeball.**

**Size:** Maximum mantle length 100 mm.

**Habitat, biology, and fisheries:** A rare oceanic, mesopelagic and bathypelagic species. Found from the surface to 1 500 m, 0 to 760 m at night, 0 to 1 250 m by day. The only known predator is *Lagenodelphis hosei* (Fraser's dolphin). Not of interest to fisheries.

**Distribution:** Atlantis Seamount, Madeira, Gulf of Guinea; central North Atlantic and Bermuda; South Africa; Indian Ocean; Tasman Sea; central Pacific.



***Mastigoteuthis magna* Joubin, 1913**

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

**FAO names:** En – Big whiplash squid; Fr – Grande loutène filamentoux; Sp – Gran flageloluria.

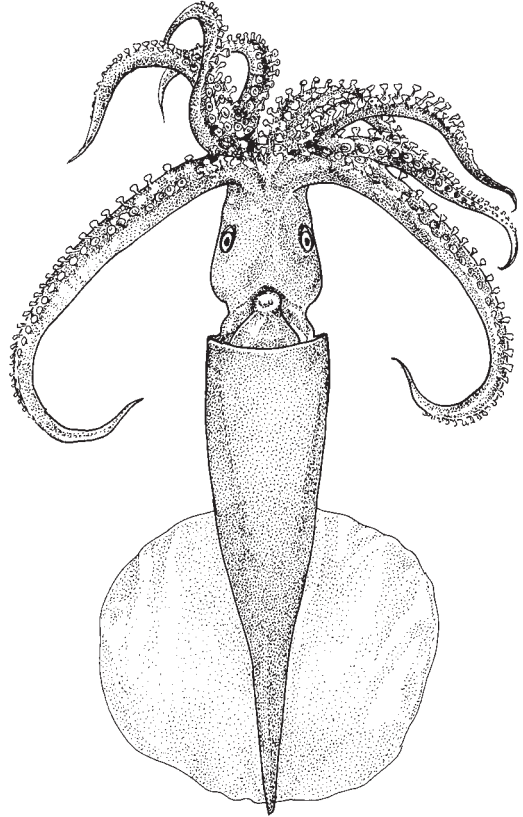
**Diagnostic characters:** Tubercles absent from mantle and elsewhere. Fin length (without tail) 66% of mantle length. **Fin width 79% of mantle length (without tail).** Mantle component of the funnel locking apparatus a rectilinear ridge narrow anteriorly and slightly wider posteriorly; funnel component an auricular-like groove. **Arm suckers with smooth inner rings.** Club length 80% of tentacle length; proximally club suckers in narrow band that gradually broadens; at midclub suckers cover three-fourths of tentacle; club suckers minute with smooth inner rings. Light organs absent.

**Size:** Maximum mantle length 160 mm.

**Habitat, biology, and fisheries:** Bathypelagic and bathyal, at night ascend to mesopelagic zone. commonly found at depths of 500 to 1 500 m. Not of interest to fisheries.

**Distribution:** Tropical and northern subtropical Atlantic. Indian Ocean and Tasman Sea.

**Remarks:** Another species, *Mastigoteuthis inermis* Rancurel, 1972, was described off the Côte d'Ivoire coast, based on a single specimen, 142 mm ML. At present, it is considered to be a junior synonym of *M. magna* (Vecchione *et al.*, 2007).



**ventral view**

(after Joubin, 1920)



## NEOTEUTHIDAE

### Neosquids

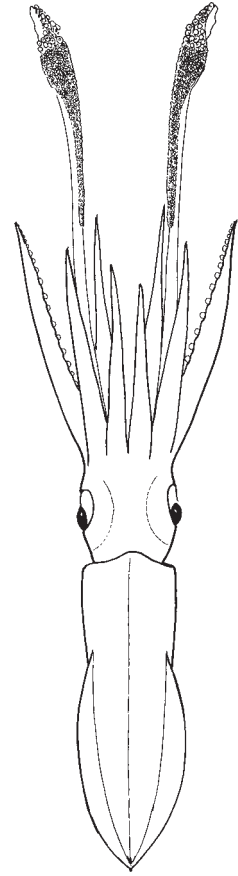
**Diagnostic characters:** Weakly muscled species of small to moderate size. Anterior fin lobes absent; posterior fin lobes free and convexes; fins attach laterally on mantle muscle. Buccal connectives attach to dorsal margins of ventral arms. Arms with biserial suckers. **Tentacular club bears in its proximal part a large number of mall suckers arranged in more than 10 rows; in the central part of the club are 4 rows of large suckers of equal or different size, while on the distal end are 3 or 4 rows of gradually smaller suckers;** carpal knobs in a single dorsal row or absent. Light organs absent.

**Habitat, biology, and fisheries:** Little is known about the biology of this group. Oceanic, meso-bathypelagic species. Captured with open nets between 200 and 3 500 m. No interest to fisheries.

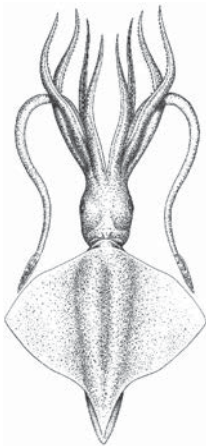
#### Similar families occurring in the area

Architeuthidae: posterior borders of fins are concave; carpal knobs in a cluster rather than a single row, or absent.

Brachioeuthidae: free anterior fin lobes and concave posterior fin borders; buccal membrane connectives attach to ventral, rather than dorsal, sides of ventral arms.

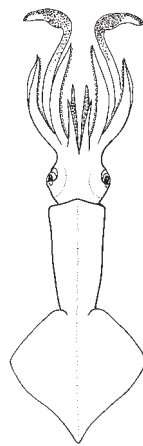


dorsal view



**Ancistrocheiridae**

(from Guerra, 1992)



**Brachioeuthidae**

#### List of species occurring in the area

The symbol is given when species accounts are included.

*Narrowteuthis nesis* Young and Vecchione, 2005.

*Neoteuthis thielei* Naef, 1921.

**Remarks:** This family, which was know as Alluroteuthidae Odner, 1923, contains 4 genera. One species of *Neoteuthis* is still undescribed.

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***Narrowteuthis nesis* Young and Vecchione, 2005**

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

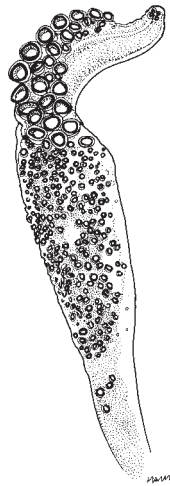
**FAO names:** **En** – Nesis' narrow squid; **Fr** – Loutène nouveau de Nesis; **Sp** – Neoluria de Nesis.

**Diagnostics characters:** Fins narrow, short (35% of ML) and attached to mantle (rather than gladius) over most of length. Tentacles long and slender. Clubs short (20% of the mantle length); with proximal suckers laterally compressed in the manus of the tentacular club; **large club suckers of the distal part of the manus with 19 or 20 slender, pointed teeth around entire margin of inner ring**; proximal teeth slightly shorter than distal teeth and size difference accentuates distally; suckers in 4 or 5 irregular series at proximal end of distal manus becoming 4 series on dactylus and 1 or 2 series on neck-like region of dactylus, which tapers to a slender, neck-like distal portion and expanded terminal pad; terminal pad with 6 or 7 suckers of varying sizes forming a circle or partial circle around a central bare space.

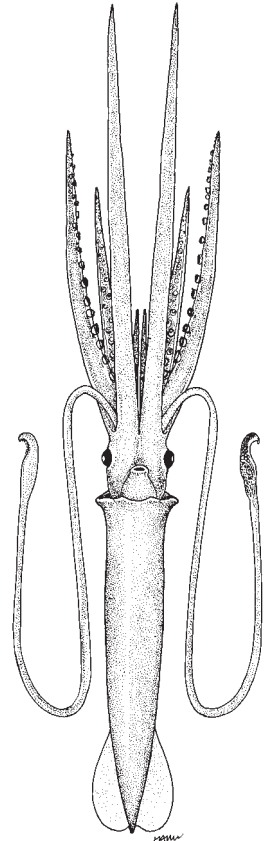
**Size:** Mantle length 100 mm.

**Habitat, biology, and fisheries:** Only 2 specimen are known; caught between 1 750 and 2 000 m. No interest to fisheries.

**Distribution:** Around the Canary Archipelago (eastern North Atlantic Ocean).



tentacular club



ventral view

(illustrations after Young & Vecchione, 2005)



*Neoteuthis thielei* Naef, 1921

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

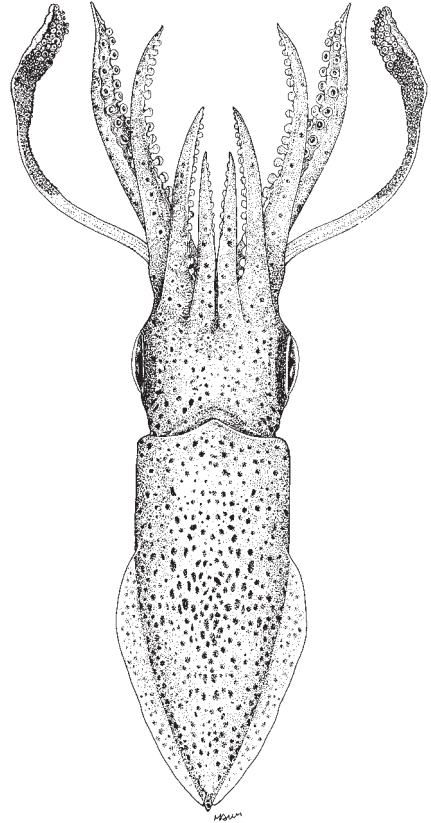
**FAO names:** **En** – Thiele's neosquid; **Fr** – Loutène de Thiele; **Sp** – Neoluria de Thiele.

**Diagnostic characters:** Fins in form of lateral narrow fringe; fin length is much more than half of mantle length; fin width much smaller than its length. Tentacles long, strong, with widened carpal part. No hooks on the arms. **Carpal part of the club occupies 67 to 80% of its length. Four rows of suckers in central part of club, median ones not larger than lateral.** Fixing apparatus located along the margin of carpal part of club, not reaching the stalk of the tentacles and consists of modified suckers only.

**Size:** Maximum mantle length 170 mm.

**Habitat, biology, and fisheries:** Very poorly-known species. Occurring in depths of 55 to 203 m by day, 0 to 400 m at night. Only known predator is *Thunnus obesus* (bigeye tuna). Not of interest to fisheries.

**Distribution:** Madeira to Gulf of Guinea; Caribbean Sea; central South Atlantic; northern and eastern Pacific.



dorsal view



**OCTOPOTEUTHIDAE**

**Octopus squids**

**Diagnostic characters:** The mantle is broad and weakly muscled. Tentacles reduced or absent in subadults and absent in adults. Arms with hooks in 2 series, replaced by suckers near armtips. Fins large, broad, muscular; fused to one another along dorsal mantle midline; length nearly equals mantle length. Some or all arms terminate in light organs. Mature males lack a hectocotylus but have a large penis that can extend well beyond the mantle opening.

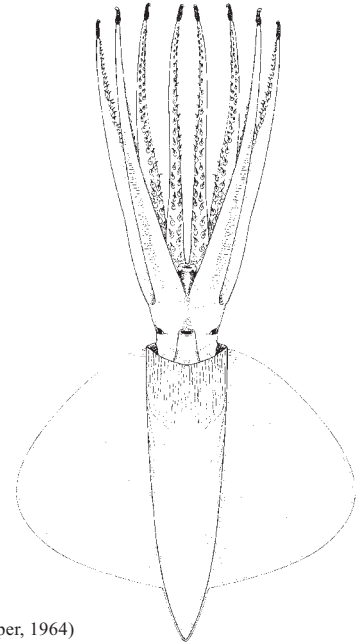
**Habitat, biology, and fisheries:** Large muscular fins apparently provide most of the force for swimming. At least 1 species, *Taningia danae*, potentially interesting for fisheries purposes.

**Remarks:** Armtips of *Octopoteuthis* are frequently lost during capture. Systematic of this genus is very confused and revision is essential.

**Similar families occurring in the area**

Other families of large-finned squids (Ancistrocheiridae, Cycloteuthidae, Magnapinnidae, Thysanoteuthidae) have tentacles. Lepidoteuthids lack tentacles but have scales in the mantle.

(after Roper, 1964)



ventral view

**Key the to genera and species of Octopoteuthidae occurring in the area**

- 1a. Dorsolateral arm tips with very large oval light organs; remaining arm tips without large light organs (Fig. 1) . . . . . *Taningia danae*
- 1b. All arm tips with slender light organs; dorsolateral arm-tip light organs not particularly enlarged . . . . . *Octopoteuthis* → 2
- 2a. One or 2 light organs in transparent tissues at posterior end of mantle ventrally; 2 light organs inside mantle cavity, on either side of ink sac, dorsal to funnel retractor muscles . . . . . → 3
- 2b. No light organs on tail, head, nor in mantle cavity, only elongated light organs on arm tips; fin reaches posterior end of mantle in juveniles, but adults have a short tail; arm hooks of large specimens with 2 accessory cusps . . . . . *Octopoteuthis rugosa*
- 3a. One large light organ in transparent tissues at posterior end of mantle ventrally; fin terminates just beyond tail light organ, not reaching posterior end of mantle; arm hooks of small specimens without accessory cusps . . . . . *Octopoteuthis* sp. A Young, 1972
- 3b. Two large light organs in transparent tissues at posterior end of mantle ventrally, one on each side of midline. . . . . → 4
- 4a. Tail light organs located on border between middle and posterior thirds of mantle; no light organs on bases of arms III and IV . . . . . → 5
- 4b. Two tail light organs located at 20 to 25% mantle length from posterior end; fin reaches posterior end of mantle; tail short, almost indistinct in juveniles; light organs present on bases of arms III and IV . . . . . *Octopoteuthis sicula*

- 5a. Fin reaches posterior end of mantle . . . . . *Octopoteuthis danae*  
 5b. Fin does not reach posterior end of mantle, its posterior margin somewhat further back than tail light organs; fin length  $\pm 75\%$  mantle length; tail long, acuminate, flattened from above, with narrow lateral fringes . . . . . *Octopoteuthis megaptera*


### Remarks to the key of species






According to Young (1972, <http://tolweb.org/Octopoteuthis/19839>) the systematics within this genus rests primarily on 3 features: (1) the number of tail photophores; (2) the size of the tail in small specimens; (3) the presence of accessory cusps on the hooks in small specimens.

In the North Atlantic, 3 forms are known: *Octopoteuthis* sp. A, with a single tail photophore, absence of accessory cusps on the arm hooks, and a long tail, and two forms with 2 tail photophores. One of the latter, *O. danae*, has a tail of moderate length while the other, *O. megaptera*, has a long tail. The type species of the genus, *O. sicula*, is likely the senior synonym of either *Octopoteuthis* sp. A or *O. danae*. *O. rugosa*, from the waters off South Africa and south Australia, is described only from very large specimens (14.5–23 cm ML) and cannot be adequately compared to many of the other species.

Nesis (1987) indicates that the presence of arm base photophores on arms III and IV is another specific character and these are absent in *O. danae* and *O. megaptera*.

### List of species occurring in the area

The symbol  is given when species accounts are included.

-  *Octopoteuthis danae* Joubin, 1931.
-  *Octopoteuthis megaptera* (Verrill, 1885).
-  *Octopoteuthis rugosa* Clarke, 1980.
-  *Octopoteuthis sicula* Ruppell, 1844.
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*Octopoteuthis danae* Joubin, 1931

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

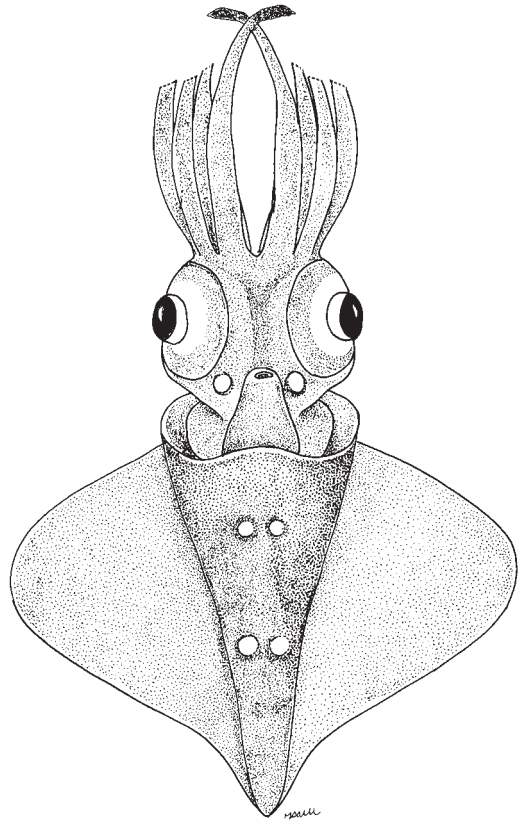
**FAO names:** **En** – Dana's octopus squid;  
**Fr** – Encornet-poulpe de Dana; **Sp** – Pulpota de Dana.

**Diagnostic characters:** **Paired light organs** in tissues at posterior end of the mantle on ventral side of the body. The mantle tissue, which covers these light organs, is transparent. A pair of light organs inside the mantle cavity on both sides of the ink sac, most concretely located on dorsal sides of the funnel retractor muscles. A pair of large light organs in tissue of posterior ventral surface of the mantle, one on each side midline. **Tail light organs located on the border between middle and posterior third of the mantle. No light organs at the bases of arms III and IV. Fin reaching the posterior end of the mantle.**

**Size:** Maximum mantle length 52 mm.

**Habitat, biology, and fisheries:** Biology unknown. Not of interest to fisheries.

**Distribution:** Northern subtropical Atlantic: Guinea Bissau; Bermuda.



ventral view



***Octopoteuthis megaptera* (Verrill, 1885)**

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

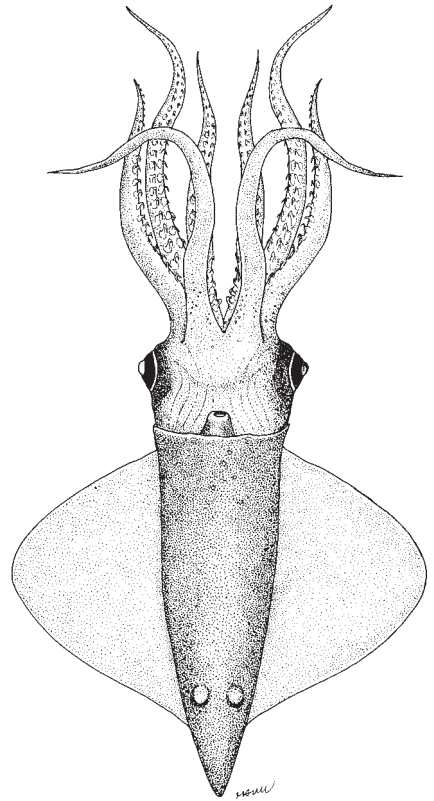
**FAO names:** **En** – Large-fin octopus squid; **Fr** – Encornet-poulpe ailé; **Sp** – Pulpota alada.

**Diagnostic characters:** Paired light organs in tissues at posterior end of the mantle on ventral side of the body. The mantle tissue, which covers these light organs, is transparent. A pair of light organs inside the mantle cavity on both sides of the ink sac. A pair of large light organs in tissue of posterior ventral surface of the mantle, one on each side midline. Tail light organs located on the border between middle and posterior third of the mantle. **No light organs at the bases of arms III and IV. Fin not reaching the posterior end of the mantle, its rear edge located somewhat farther than level of tail light organ. Fin length about 75% mantle length. Tail long, acuminate, flattened from above, with narrow lateral fringes.**

**Size:** Maximum mantle length 200 mm; more often 80 to 100 mm.

**Habitat, biology, and fisheries:** Occurring at depths between 50 and 1 100 m. Female weight 100 g at approximately 80 mm mantle length. Tropical-subtropical cosmopolitan, mesopelagic to bathypelagic and bathyal, ascending to the epipelagic zone at night. Located at 37 to 278 km from shore off Namibia. Males maturing from 45 to 87 mm, females from 57 to 100 mm; fully mature at more than 100 mm mantle length. Not of interest to fisheries.

**Distribution:** Gulf of Guinea, Namibia; central Atlantic; western Atlantic from Nova Scotia to Suriname; Somalia; Japan; eastern central Pacific.



ventral view



***Octopoteuthis rugosa* Clarke, 1980**

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

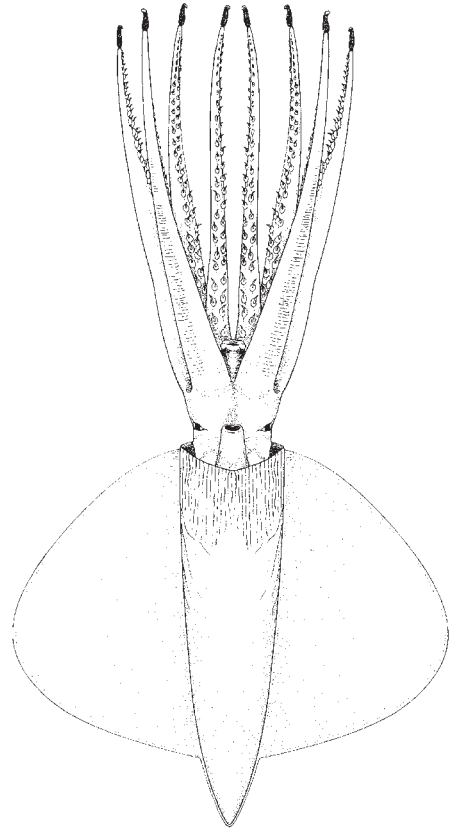
**FAO names:** **En** – Rough-skin octopus squid; **Fr** – Encornet-poulpe rugueux; **Sp** – Pulpota rugosa.

**Diagnostic characters:** No light organs on tail or head nor in mantle cavity, only elongated light organs on arm tips. In juveniles, fin reaching posterior end of the mantle, but adults have a short tail. **Ventrally, the anterior mantle of females shows longitudinal grooves in the gelatinous layer.**

**Size:** Maximum mantle length 230 mm (female); maximum size estimated from beaks ranges from 210 to 270 mm mantle length and 550 g total weight.

**Habitat, biology, and fisheries:** Tropical-subtropical Atlantic and Indo-West Pacific, mesopelagic. Found at depths of 503 to 700 m. Known predators are *Prionace glauca* (blue shark), *Xiphias gladius* (swordfish), *Hyperoodon planifrons* (southern bottlenose whale), *Mesoplodon layardii* (strap-toothed whale), *Physeter catodon* (sperm whale) and *Diomedea exulans* (wandering albatross). Not of interest to fisheries.

**Distribution:** Morocco, Mauritania; Equatorial Atlantic; Namibia and South Africa; Nova Scotia; Bay of Biscay; south Georgia; Sulu and Flores seas; southwestern Australia and Tasman Sea.



**ventral view**

(after Roper, 1964)



***Octopoteuthis sicula* Rüppell, 1844**

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

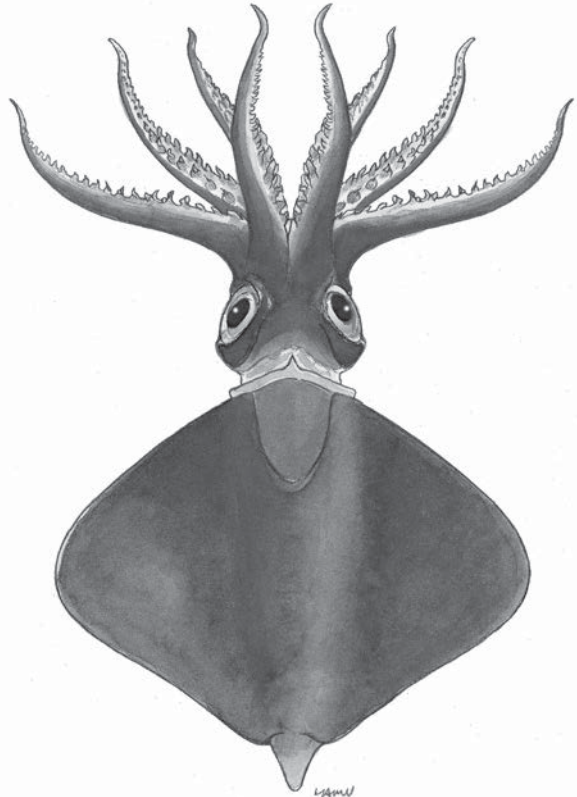
**FAO names:** **En** – Rüppell's octopus squid; **Fr** – Encornet-poulpe de Rüppell; **Sp** – Pulpito volador.

**Diagnostic characters:** Paired light organs in tissues at posterior end of the mantle on ventral side of the body one on each side midline. The mantle tissue, which covers these light organs, is transparent. A pair of light organs inside the mantle cavity on both sides of the ink sac. Tail light organs located at distance of 20 to 25% of mantle length from posterior end of the body. Fin reaches posterior end of the mantle. Light organs present at bases of arms III and IV. Tail short, almost indistinct in juveniles.

**Size:** Maximum mantle length 500 mm; more frequent sizes 200 mm in females and about 130 mm mantle length in males.

**Habitat, biology, and fisheries:** Tropical and subtropical Atlantic, Indian and Pacific oceans and Mediterranean Sea; mesopelagic and bathypelagic, ascending to the epipelagic zone at night (0 to 2 500 m; 750 to 1 110 m by day and 692 to 1 478 m at night), 80 km from shore off Oregon. Known predators include *Coryphaenoides armatus* (abyssal grenadier), *C. filifer* (filamented rattail), *Thunnus alalunga* (albacore), *T. thynnus* (bluefin tuna), *Stenella coeruleoalba* (striped dolphin) and *Ziphius cavirostris* (Cuvier's beaked whale). Males mature from mantle length 122 mm and females from 234 mm. Potential interest to fisheries.

**Distribution:** Central North Atlantic, Senegal, Côte d'Ivoire, Gulf of Guinea, Angola; North Atlantic from Labrador Current, northwest of Newfoundland to Nova Scotia and Scotland to Galicia and Azores; southwest Atlantic; southern Africa; Mediterranean; Indian and Pacific oceans.



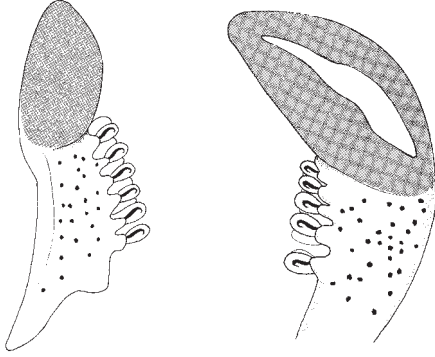
dorsal view



***Taningia danae* Joubin 1931**

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

**FAO names:** **En** – Taning's octopus squid; **Fr** – Encornet-poulpe de Taning; **Sp** – Pulpota de Taning.



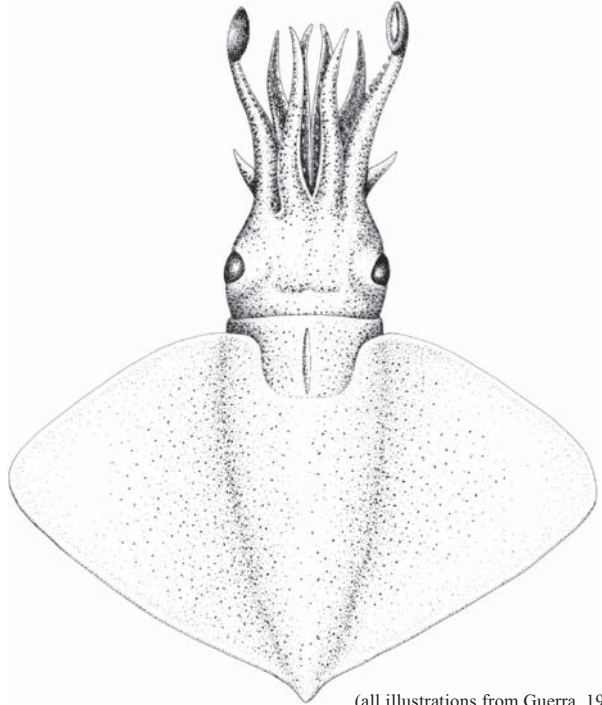
**light organs in arms II**

**Diagnostic characters:** Mantle broad and robust. Fins very large and thick, occupying approximately 75% mantle length. Its width is 130% of mantle length. Adults without tentacles. **Arms with 2 rows of strong hooks. Second pair of arms each with a large, distinct, black light organ at the tip,** which luminescence surface is covered by an eyelid-type mechanism.

**Size:** Maximum mantle length 170 cm.

**Habitat, biology, and fisheries:** The biology of this species is poorly known. It is an oceanic and mesopelagic species that probably spawns on the seafloor. Occurring in depths between 200 and 1 500 m. It feeds on epipelagic and upper mesopelagic finfishes, crustaceans and cephalopods and is heavily preyed upon by marine mammals and pelagic fishes. Females considerably larger than males. Assuming a daily periodicity in the deposition of growth increments in the statoliths, the maximum estimated age of 2 specimens of 66 and 124 kg would be 21 and 33 months, respectively. The most remarkable feature of a 16 kg and 700 mm mantle length male was the presence of a long penis with a total length of 730 mm that protruded 230 mm outside the mantle. Spermatophores long, up to 170 mm. The estimated potential fecundity was close to 5 million oocytes and the size range of the oval oocytes varied from 0.4 to 1.0 mm. The reproductive strategy adopted by this species seems to rely on multiple spawning, which is characteristic of a relative environmental stability. Potentially interesting species for fisheries purposes. Most catches were taken by demersal and bottom trawlers.

**Distribution:** It is a cosmopolitan species, mainly found in tropical and subtropical waters, but also in boreal and notalian waters.



(all illustrations from Guerra, 1992)

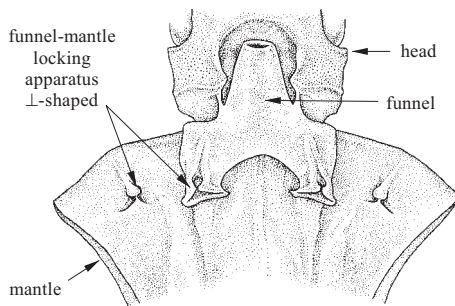
**dorsal view**



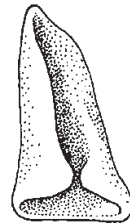
## OMMASTREPHIDAE

### Flying squids and arrow squids

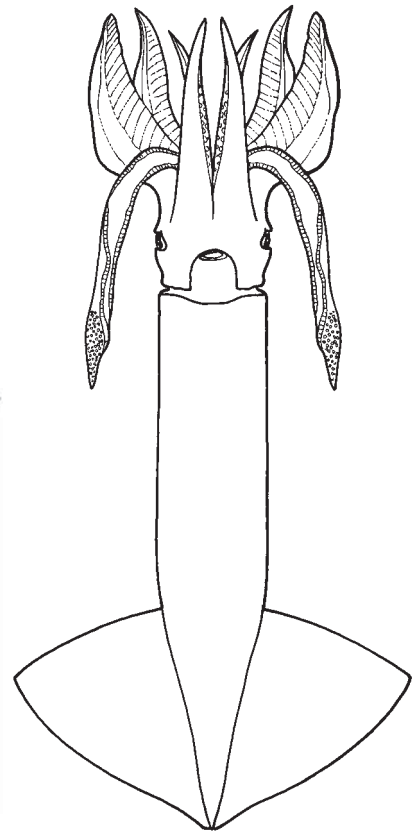
**Diagnostic characters:** Medium- to large-sized squids (common between 200 and 500 mm ML). **Funnel locking cartilage with an inverted T-shaped groove.** Arms with biserial suckers. Four rows of suckers on tentacular clubs (club dactylus with 8 sucker series in *Illex*). Hooks never present on arms or clubs. One of the ventral pair of arms usually hectocotylized in males. Buccal connectives attach to dorsal borders of ventral arms. Gladius distinctive, slender. Paralarvae with fused tentacles forming a trunk-like proboscis.



**internal view of mantle**



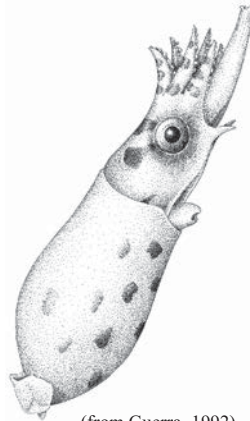
**funnel cartilage**



**ventral view**

#### **Habitat, biology, and fisheries:**

Oceanic and neritic. Found from the surface to 2 500 m. This is one of the most widely distributed and conspicuous families of squids in the world. Ommastrephids are powerful swimmers and some species form large schools. Large numbers of small eggs are produced, encapsulated in gelatinous masses that either float on or near the surface or settle on the bottom. Hatching of the 'Rhynchoteuthion' paralarvae occurs after a few days to a few weeks.



(from Guerra, 1992)

**Rhynchoteuthion  
paralarva**

Post spawning mortality is high. Growth is very fast; in many species the lifespan does not exceed 1 year. Flying squids are very active predators on many kind of prey (fish, pelagic crustacean and other squids); cannibalism is common. They are preyed upon by sea birds, marine mammals and large fishes. Some neritic species exhibit strong seasonal migrations, wherein they occur in huge numbers in inshore waters where they are accessible to fisheries activities. Most species are exploited commercially. *Todarodes pacificus* makes up the bulk of the squid landings in Japan, and the captures of *Illex argentinus* on the Patagonian shelf and around the Falkland islands reach up to 300 000 tonnes some years). Trawling and jigging improved by light attraction are by the far the most common fishing methods. The large size of most species and the heavily muscled structure, make them ideal for human consumption. They are marketed fresh, frozen, or processed in various ways, such as dried, salted, salted-fermented.

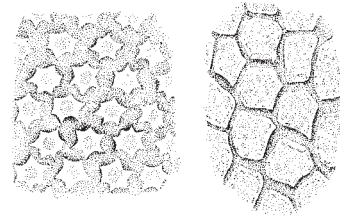
**Similar families occurring in the area**

Lepidoteuthidae: distinct “scales” on surface of mantle; funnel-locking apparatus a simple, straight groove.

Loliginidae: eyes covered with a transparent corneal membrane; funnel-locking apparatus a simple, straight groove; small suckers on buccal lappets.

Onychoteuthidae: tentacular clubs with claw-like hooks; funnel-locking apparatus a simple, straight groove.

Thysanoteuthidae: funnel-locking apparatus a long, narrow longitudinal groove with a short broad transverse groove at midlevel; fins broad, rhomboidal, extending nearly full length of mantle.



scales on surface of mantle  
**Lepidoteuthidae**

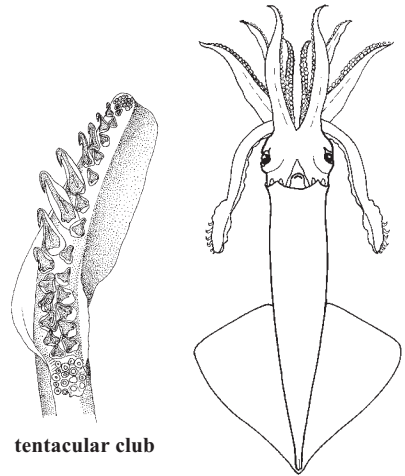


simple, straight  
Lepidoteuthidae,  
Loliginidae

T-shaped  
Thysanoteuthidae

⊥-shaped  
Ommastrephidae

**funnel locking apparatus**

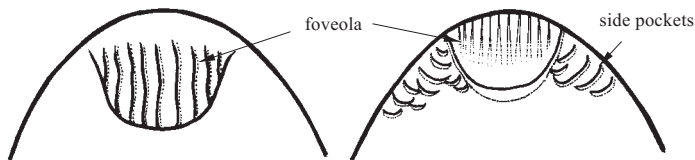


tentacular club

**Onychoteuthidae**

**Key to the subfamilies, genera and species of Ommastrephidae occurring in the area**

- 1a. Funnel groove without foveola or with foveola but without lateral pockets (Fig. 1a); funnel cartilage short, with almost straight longitudinal groove; tentacular fixing apparatus weakly developed, without tubercle-like knobs . . . . . → 2
- 1b. Funnel groove with foveola and lateral pockets (Fig. 1b) (the latter sometimes absent in *Eucleoteuthis* and *Hyaloteuthis*); funnel cartilage elongate, its longitudinal groove slightly bent anteriorly; tentacular fixing apparatus with 1 or several knobs alternating with suckers . . . . . **Subfamily Ommastrephinae** → 6



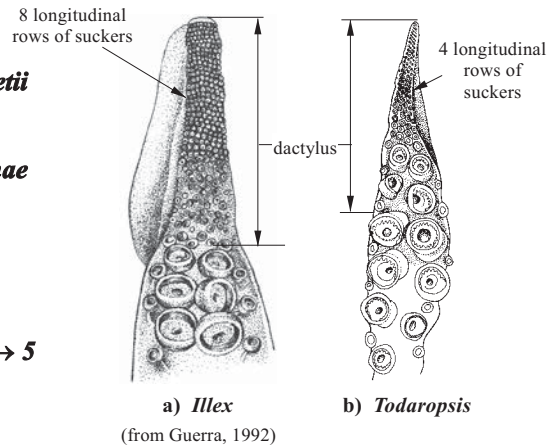
a) subfamily **Todarodinae**      b) subfamily **Ommastrephinae**

**Fig. 1 funnel groove**

- 2a. Funnel groove simple, without foveola . . . . . **Subfamily Illicinae** → 3
- 2b. Funnel groove with foveola (Fig. 1) and as rule with longitudinal cutaneous ridges (not always conspicuous in *Ornithoteuthis*) but always without lateral pockets . . . . . → 4



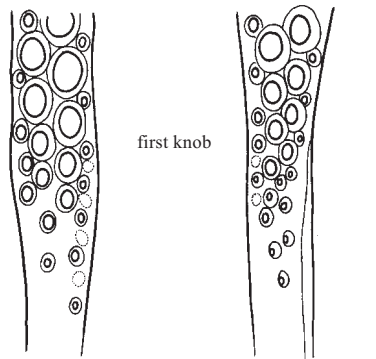
- 3a. With 8 longitudinal rows of small suckers at the end of tentacular club (Fig. 2a) . . . . . ***Illex coindetii***
- 3b. With 4 longitudinal rows of suckers at the end of the tentacular club (Fig. 2b) . . . . . ***Todaropsis eblanae***
  
- 4a. Mantle cylindrical, without tail; carpal of suckers on club long, occupying considerable part of the tentacular stalk; no light organs on viscera . . . . . **Subfamily Todarodinae → 5**
- 4b. Mantle narrow, conical, attenuate posteriorly into thin tail; carpal group of club suckers short; 2 light organs on viscera . . . ***Ornithoteuthis antillarum***



**Fig. 2 tentacular club**


- 5a. Fin width 54 to 57% mantle length; length of dorsal arms 39 to 44% mantle length; tentacle length 60 to 68%, club length 49 to 55% mantle length; manus length 36 to 41% mantle length . . . . . ***Todarodes sagittatus***
- 5b. Fin width 61 to 63% mantle length; length of dorsal arms 46 to 51% mantle length; tentacle length 88 to 97%, club length 63 to 71% mantle length; manus length 45 to 50% mantle length . . . . . ***Todarodes angolensis***
  
- 6a. Ventral surface of mantle with external light organs . . . . . → **7**
- 6b. Ventral surface of mantle without external light organs . . . . . → **8**
  
- 7a. Pair of long stripes of subcutaneous, bioluminescent tissue (large elongate photophores) along ventral side of mantle, 1 on each side of midline, each stripe broken posteriorly by gap level of maximum width of fin; 2 oval bioluminescent spots on head near anterior margin of mantle aligned with the base of each ventral arm . . . . . ***Eucleoteuthis luminosa***
- 7b. Nineteen round, bioluminescent patches arranged in a fixed pattern on ventral side of mantle, which form convergent or separate pairs; bioluminescent patches at base, in middle and near tip of each ventral arm . . . . . ***Hyaloteuthis pelagica***










- 8a. No more than 2 suckers in carpal part of club proximal to first knob (Fig. 3a); dorsal light organ present subcutaneously on mantle. . . . . ***Sthenoteuthis pteropus***
- 8b. From 4 to 7 suckers in carpal part of club proximal to first knob (Fig. 3b); dorsal light organ absent subcutaneously on mantle . . . . . ***Ommastrephes bartramii***



a) *Sthenoteuthis*      b) *Ommastrephes*  
**Fig. 3 tentacular club**

### List of species occurring in the area

The symbol  is given when species accounts are included.

-  *Eucleoteuthis luminosa* (Sasaki, 1915).
-  *Hyaloteuthis pelagica* (Bosc, 1802).
-  *Illex coindetii* (Vérany, 1839).
-  *Ommastrephes bartramii* (Lesueur, 1821).
-  *Ornithoteuthis antillarum* Adam, 1957.
-  *Sthenoteuthis pteropus* (Steenstrup, 1855).
-  *Todarodes angolensis* Adam, 1962.
-  *Todarodes sagittatus* (Lamarck, 1798).
-  *Todaropsis eblanae* (Ball, 1841).

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***Eucleoteuthis luminosa* (Sasaki, 1915)**

**Frequent synonyms / misidentifications:** *Symplectoteuthis luminosa* Sasaki, 1915 / None.

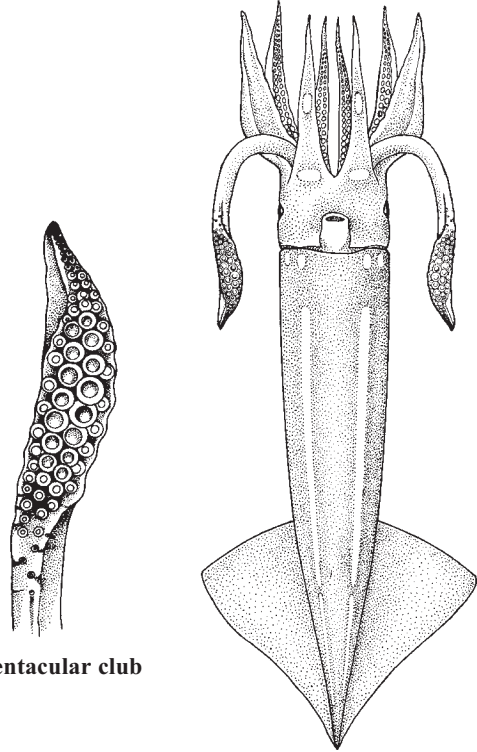
**FAO names:** **En** – Luminous flying squid; **Fr** – Encornet lumineux; **Sp** – Pota luminosa.

**Diagnostic characters:** Mantle muscular, conical, tapering to moderately sharp tail. Fins sagittate, length about 50% mantle length; width about 50% mantle length; single fin angle 35° to 50°; **2 sets of vivid longitudinal stripes along ventral surface of the mantle (light organs); a large photophoric patch at the bases of each arm IV.** Left arm hectocotylized at distal end with absence of suckers: paired papillae are remnants of sucker stalks.

**Size:** Maximum mantle length 180 mm in females, about 227 mm in males.

**Habitat, biology, and fisheries:** An oceanic species which biology is practically unknown. Occurring probably from the surface to 1 300 m. It spawns egg masses that resemble large gelatinous balls. The paralarvae range from 1.4 to 12.4 mm mantle length and are characterized by having subocular and intestinal light organs, a relatively long proboscis index (length of proboscis/mantle length = 0.70). It does not appear to school as the majority of ommastrephid squids. Incidentally caught in the jigging fishery for *Todarodes pacificus*, but it is not utilized currently. Apparently abundant in mixing waters between Kurishio and the Oyashio off Japanese waters.

**Distribution:** Bi-peripheral oceanic species with ranges in the North Pacific Ocean and the southern hemisphere. Absent in the North Atlantic. Distributed in the southeastern Atlantic, between 10°S and 36°S. Pacific Ocean: subtropical and temperate waters. Indian Ocean: between 15°S and 34°S.



tentacular club

ventral view



***Hyaloteuthis pelagica* (Bosc, 1802)**

**Frequent synonyms / misidentifications:** *Sepia pelagica* Bosc, 1802; *Ommastrephes pelagicus* d'Orbigny, 1834–1848; *Ommatostrephes pelagicus* Steestrup, 1880.

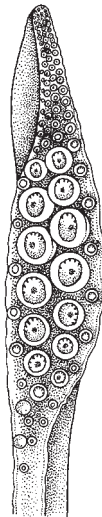
**FAO names:** En – Glassy flying squid; Fr – Encomet vitreux; Sp – Pota estrellada.

**Diagnostic characters:** The funnel groove has a **foveola with 7 to 9 longitudinal folds and 0 to 3 side pockets**, often obscure. **Large cutaneous photophores present** on the ventral surface of the mantle and arms in the form of round, yellow, reflective patches: **3 situated along each ventral arm and 19 arranged in a fixed pattern on the ventral surface of the mantle**, where they form pairs, either closely set or well-separated. **A single, round photophore on ventral surface of each eye and 1 round photophore on the intestine.** Dactylus of tentacular club with 4 series of small suckers. Carpal-locking apparatus on tentacular stalk with 1 knob and 1 smooth-ringed sucker. Largest medial suckers on manus of club with 1 large, pointed tooth at distal margin. Protective membrane of tentacular club very poorly developed. Tips of all arms not attenuate. Arms have 15 to 22 pairs of suckers. **Right, or rarely left, ventral arm has a hectocotylus of the smooth type**, with the absence of suckers on the modified portion. Fins rhomboidal with straight or very slightly convex posterior edges. Fin length 35 to 40% and fin width 55 to 62% of mantle length; fin angle 45° to 55°. Mantle-funnel locking cartilage not fused.

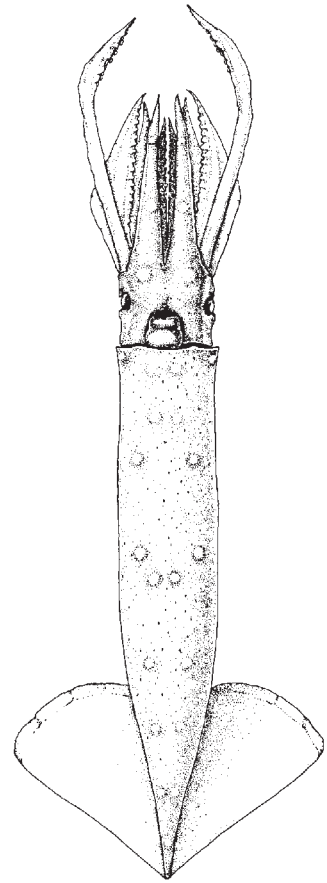
**Size:** Maximum mantle length 105 mm.

**Habitat, biology, and fisheries:** This species is distributed mainly in zones of trade-wind currents and adjoining parts of the central waters of the cyclonic circulations; it is absent from zones of equatorial divergence. This epipelagic to mesopelagic and upper bathypelagic species inhabits open waters over great depths of more than 400 m. Paralarvae and juveniles inhabit the upper 50 m at night and from 100 to 200 m during the day. Subadult and adult squids inhabit subsurface layers from 15 to 20 m to 150 m at night. During the daytime they inhabit depths from 200 to 800 m. Males reach maturity at 50 to 65 mm mantle length (age 80 to 100 days), and females mature from 50 to 90 mm (age 80 to 135 days). The life span is half a year. Spawning occurs throughout the year with some seasonal variability in activity. Egg size is 0.9 to 1.0 mm, and female potential fecundity varies between 30 000 and 100 000 ova. Oviducts of mature females contain a maximum of 500 ripe eggs. The species is an intermittent, multibatch spawner. It feeds mainly on juvenile teleosts and squid, hyperiid amphipods, crab larvae, chaetognathes and to a lesser degree on copepods, shrimps, euphausiids and teleost larvae. Its predators include several oceanic species of ommastrephid squids, lancet fish, different species of tunas, marlins, sea birds and dolphins. The species is not fished commercially.

**Distribution:** All tropical and subtropical oceans. In the eastern Atlantic Ocean from 10°N to 28°N and between 5°S and 15°S.



tentacular club



ventral view



*Illex coindetii* (Vérany, 1839)

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

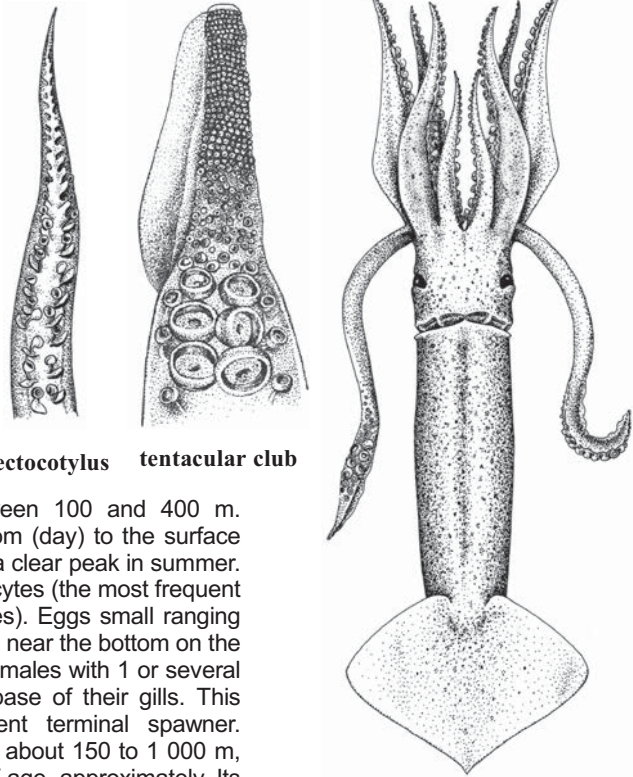
**FAO names:** **En** – Broadtail shortfin squid; **Fr** – Encornet rouge; **Sp** – Pota voladora.

**Diagnostic characters:** Funnel groove without foveola or lateral pockets. Rhomboid fins, width-to-length ratio 1,4 to 1,5; fin angle obtuse (90 to 100° or more). Arms with 2 rows of suckers. Tentacular club with 8 longitudinal rows of minute subequal suckers. Left or right ventral arm of male hectocotylized with a modified length ranging from 15 to 33% of its arm length, distal trabeculae modified to papillose flaps.

**Size:** Maximum mantle length 380 mm in females and 280 mm in males.

**Habitat, biology, and fisheries:** The species live at the bottom in the middle and lower sublittoral and upper bathyal, in temperate latitudes. Occurring from the surface to 1 100 m, most frequent between 100 and 400 m. Undertake vertical migrations from the bottom (day) to the surface (daytime). Spawns throughout the year with a clear peak in summer. Fecundity ranging from 3 500 to 300 000 oocytes (the most frequent range being from 30 000 to 200 000 oocytes). Eggs small ranging from 0.8 to 1.2 mm (major axis), possibly laid near the bottom on the continental slope at midwaters. Copulated females with 1 or several spermatophore packages attached at the base of their gills. This species can be considered as intermittent terminal spawner. Juveniles and adults have been collected at about 150 to 1 000 m, and they recruit to the fishery at 3 months of age, approximately. Its diet was composed by, in decreasing order of importance, fish, crustaceans and cephalopods. It was also noted the presence of cannibalism. *Illex coindetii* is mainly neritic nekto-benthic predator with wide spectra of preys. Mantle length instantaneous relative growth rate were 0.72% for males and 0.84% for females. Its life span is about 1 year for males and females. The age at which individuals mature is variable, ranging from 140 to 271 days in males and from 183 and 285 in females. Growth rates in both sexes were dependent of the season of hatching. Squids hatched in winter attained larger sizes for the same age than squids hatched in other seasons. These seasonal differences in growth were only evident after squids reached 8 months of age. No population or subpopulation differentiation was apparent for Atlantic and Mediterranean samples comparison. This species is taken throughout the year as bycatch in bottom and pelagic trawls, and, in lesser extent, with gill and trammel nets, in depths between 100 and 400 m in the Mediterranean, off West Africa and the northeastern Atlantic. It has an increasingly fisheries value. No separate statistics are reported.

**Distribution:** Supposedly the only amphiatlantic *Illex* species. Its distribution extends over the Mediterranean Sea and eastern Atlantic from 60°N to 17°S and 30°W, and in the western Atlantic waters, from the waters of Virginia to Venezuela.



hectocotylus      tentacular club

dorsal view

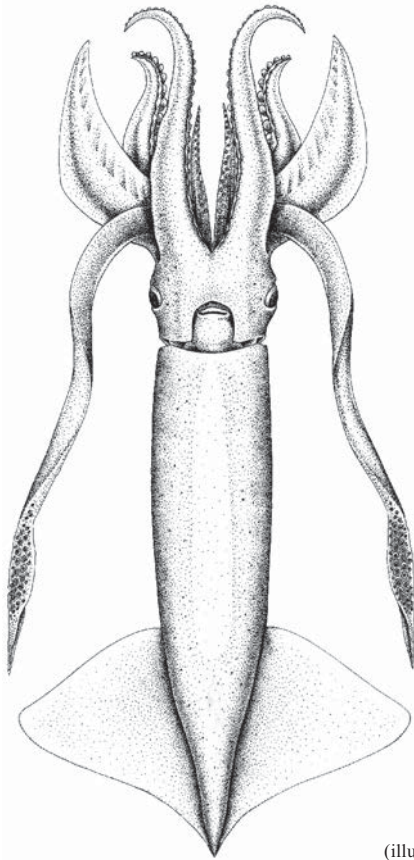
(all illustrations from Guerra, 1992)



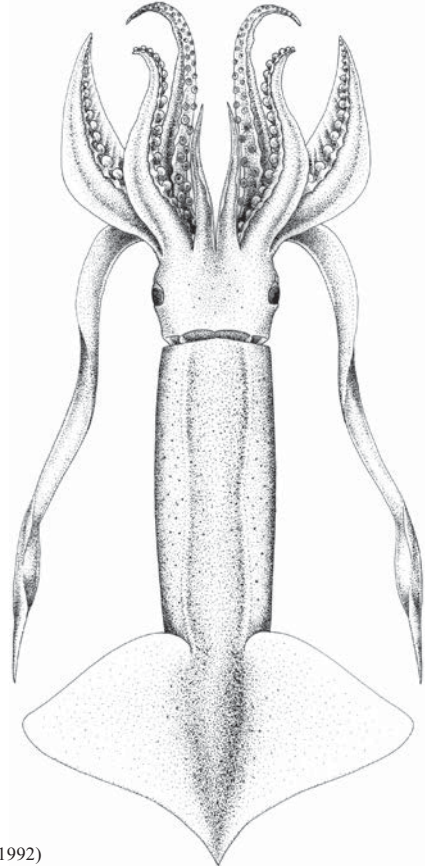
***Ommastrephes bartramii*** (Lesueur, 1821)

**Frequent synonyms / misidentifications:** *Ommastrephes caroli* (Furtado, 1887) / None.

**FAO names:** **En** – Neon flying squid; **Fr** – Encornet volant; **Sp** – Pota saltadora.



ventral view



dorsal view

(illustrations from Guerra, 1992)

**Diagnostic characters:** Mantle muscular, robust, cylindrical in the anterior part and not drawn out posteriorly into a pointed tail. **Funnel groove with foveola and 2 to 5 side pockets.** Square-shaped head with 4 folds in each side of neck region. Fins muscular, length 35 to 45% of mantle length, width about 60% of the mantle length and single angle 45 to 50°. Arms with 2 rows of suckers, which central suckers have 20 to 25 quitinous conical teeth of different sizes. The distal suckers possess 7 large conical teeth. **In all individuals, but especially in adults, the specimens possess a wide triangular membrane (269 to 34% of the ML) resembling a sail in the ventral side of the ventrolateral arms, which length surpasses 50% of the arm length.** Tentacle robust, longest than the mantle, with a club with 4 longitudinal rows of suckers, the central ones being larger than the marginal ones. Suckers of dactylus small and disposed in 4 to 6 rows. The suckers of the manus are disposed in 4 rows. Four to 6 small suckers on the tentacular stalk proximal to the first smooth knob of the fixing apparatus. **A long golden or silvery stripe along the ventral midline from mantle opening to level of fin insertion (probably it is a luminescence organ). Similar golden tissue on ventral surface of head and ventral arms. Numerous closely-packed, small, very irregular shaped, often interconnected, light organs embedded under the skin in muscle of mantle ventrally. Similar light organs occur in patches on ventral surface to head.**

**Size:** Maximum mantle length 900 mm but more often within the range 300 to 400 mm.

**Habitat, biology, and fisheries:** Mesopelagic and epipelagic cosmopolitan species inhabiting from the surface up to 1 500 m depth. Excellent swimmer species. Undertakes important seasonal horizontal migrations in schools and also day/night vertical movements. Spawning season in the Pacific extended from January to June with 2 main annual cohorts growing at different rates. Two spawning peaks in the Atlantic populations in summer and autumn, with different growth rates. Potential fecundity was estimated to about 400 000 oocytes. It is considered as a multiple spawner. Life span of 1.5 to 2 year. Feeds mainly on teleostean fish and crustaceans, and in a lesser extent of cephalopods, even cannibalism. With the decline of the stocks of *Todarodes pacificus*, the effort of the Japanese squid fishery shifted towards the exploitation of flying squids with trammel nets. There are no fisheries directed at this species outside the Pacific, although several authors have demonstrated the importance as a potential resource in the Atlantic, as shown its presence as an important part of the diet of large teleosts and marine mammals. A recent estimation of the potential biomass of *Ommastrephes bartramii* is about 10 to 13 million tonnes.

**Distribution:** Worldwide in subtropical and temperate oceanic waters, but distribution discontinuous (apparently non-tropical and absent in equatorial waters).

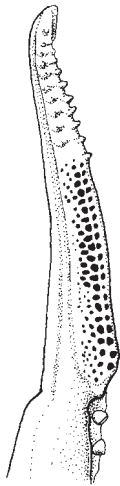




***Ornithoteuthis antillarum* Adam, 1957**

**Frequent synonyms / misidentifications:** None / *Ornithoteuthis volatilis* Silva-Mello, 1998.

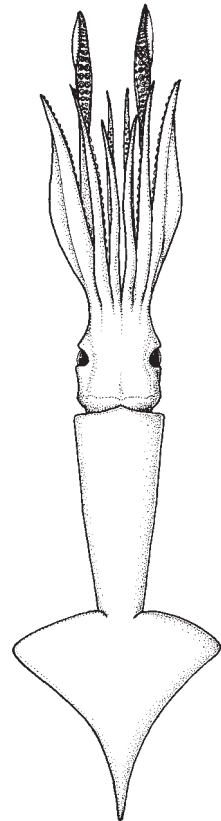
**FAO names:** **En** – Atlantic bird squid; **Fr** – Encornet oiseau; **Sp** – Pota pájaro.



hectocotylus



tentacular club



dorsal view

**Diagnostic characters:** Mantle drawn out posteriorly as a pointed tail; foveola of funnel groove with 7 to 12 very indistinct folds, side pockets often obscure. Suckers on tip of tentacular clubs in 4 longitudinal rows. A long, thin strip of luminous tissue along ventral midline of viscera posterior to heart. No external light organs; discrete light organs on the ink sac and rectum. No distinct fixing apparatus on tentacular club. Purplish maroon, darkest on dorsal surface.

**Size:** Maximum mantle length up to 300 mm.

**Habitat, biology, and fisheries:** May inhabit continental shelf and slope waters or be associated with islands. It has been seen frequently from submersibles at 600 to 1 000 m depth. The species is infrequently caught but its rarity in collections undoubtedly is a reflection of the animal's rapid, powerful swimming ability. Specimens have been captured in bottom fishing with trawls during the day at 585 to 1 100 m (mostly 640 to 825 m); night-time captures were made in large midwater trawls at 100 to 600 m over very deep water and by dip net at the surface in the open ocean. Not currently fished commercially; too few data are available on distribution, abundance and biology to allow prediction of fishing potential. The species is edible.

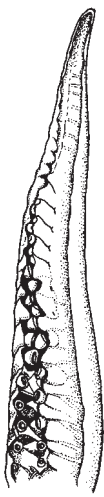
**Distribution:** Tropical and subtropical amphi-Atlantic species. Recorded from 45°–40°N to 40°S in the western Atlantic and from 20°N to about 28°S in the eastern Atlantic.



***Sthenoteuthis pteropus* (Steenstrup, 1855)**

**Frequent synonyms / misidentifications:** *Ommatostrephes pteropus* Stenstrup, 1855 / None.

**FAO names:** **En** – Orangeback flying squid; **Fr** – Encornet orange; **Sp** – Pota naranja.

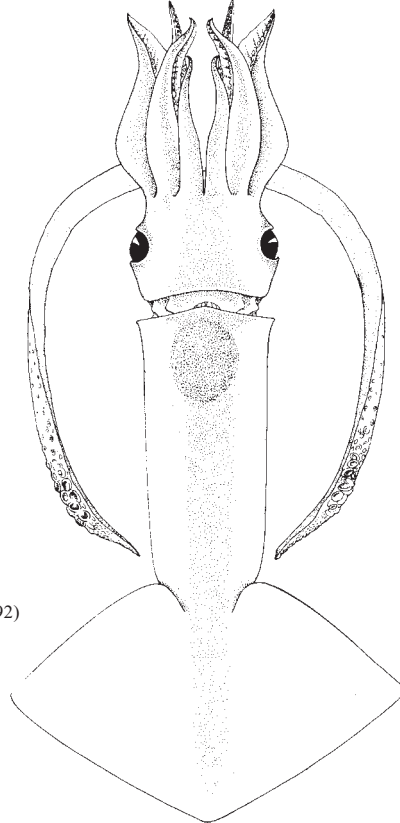


hectocotylus



tentacular club

(all illustrations from Guerra, 1992)



dorsal view

**Diagnostic characters:** Mantle robust and muscular, cylindrical anteriorly and conical posteriorly, not drawn out into a pointed tail. **Funnel groove with foveola and 2 to 5 side pockets.** Fins muscular, length 45 to 50% of mantle length, width 75 to 85% of mantle length; single fin angle 55° to 60°. Tentacles robust with a pointed club. Manus with 2 fleshy knobs and 0 to 2 tiny suckers below the first knob. Suckers of manus disposed in 4 longitudinal rows, which central ones are enlarged. The quitinous rings of the enlarged suckers with 16 to 28 sharp and conical teeth. Rings of large club suckers with 1 large tooth on distal edge. **Two light organs on intestine, one at border of middle and posterior thirds and the remaining one, only visible in juveniles, in the posterior end. Luminous spots and stripes on ventral side of mantle, head and ventral arms. A large, oval patch on the anterodorsal part of the mantle just beneath the skin consisting of numerous densely packed, small light organs. Orange in colour.**

**Size:** Females reach 650 mm mantle length. Males somewhat smaller.

**Habitat, biology, and fisheries:** An oceanic and nektonic species represented by a number of regional self-reproducing intraspecific populations, which inhabit oceanic large-scale circulatory systems extending for hundreds and thousands of miles. It ranges from the surface to about 1 500 m and undertakes daily vertical and important horizontal migrations. The paralarvae, juveniles and adults are selectively distributed in distinct ecological niches, which are characterized by different oceanographic conditions. The spawning area in the eastern equatorial Atlantic in June-November occupies warm waters to the north of the equator and the Lomonosov current in its southern border. Paralarvae are quickly transported out of the spawning area and spread widely in the equatorial zone. The larval stage lasts 32 to 38 days. At ages from 14 to 38 days, the daily relative growth rates of mantle length decrease from 7.5 to 2.8%. The mean value of raw mortality at ages 12

to 24 days was 0.258. During the proboscis division at age 25 to 35 days, a sharp decrease in larval growth rates and a simultaneous increase of mortality were observed. The southern branch waters of the south equatorial current (SEC) are the main feeding ground. The lower temperature of this branch possibly inhibits maturation of females, which migrate into warmer waters to spawn. Populations from different geographic areas form subpopulations that differ also genetically. The egg masses of about 150 000 to 200 000 eggs are deposited in the water column. The life span is about 1 to 2 years for both sexes. Myctophids, macroplanktonic crustaceans, squids are the main prey of this species. Cannibalism has been observed. Frequently preyed by swordfish, tunas, other large teleosteans and sperm whales. The instantaneous biomass of *Sthenoteuthis pteropus* was estimated from 4 to 6 million tonnes. per year. This species is mainly caught off shore, over the slope. Of potential commercial importance.

**Distribution:** In tropical and temperate Atlantic waters.



***Todarodes angolensis* Adam, 1962**

**Frequent synonyms / misidentifications:** None / *Todarodes sagittatus* Sanchez (1981, 1982, 1988), Sanchez and Moli (1984).

**FAO names:** En – Angola flying squid; Fr – Toutenon angolais; Sp – Pota angolense.

**Diagnostic characters:** Funnel groove with foveola and without side pockets. Arms with 2 rows of suckers. Arm suckers rings large distal teeth alternating with very small teeth. Tentacular club with 4 longitudinal rows of suckers, the central rows being larger than the marginal ones; **carpal area of the club very short with 4 pairs of suckers**. Not light organs on viscera.

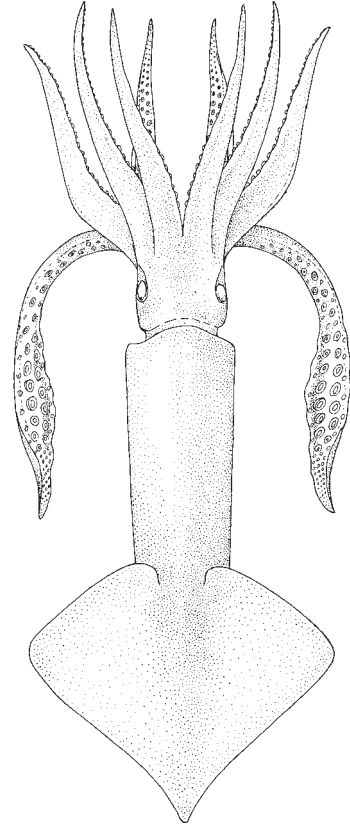
**Size:** Maximum mantle length 433 mm (females).

**Habitat, biology, and fisheries:** The biology of this species is practically unknown. Occurring from the surface to about 1 500 m, more abundant from 150 to 400 m. From weight–length relationships it has been observed that the pattern of weight gain differs between the sexes. The onset of female sexual maturity is reached from 300 to 350 mm mantle length in Namibian waters. During copulation the sperm is deposited by the male in the buccal membrane of female. It seems to have a patchy spatial distribution off Namibian waters, where it undertakes vertical migrations, towards the surface at night and towards the bottom during the day. There is not direct fishery for this species; it is caught as bycatch in other trawl fisheries. No separate statistics are reported.

**Distribution:** In the eastern Atlantic limited to south of 13°S; it occurs around South Africa and reaches into the Indian Ocean where limits are unknown.



tentacular club



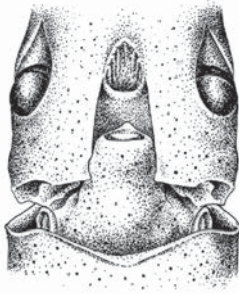
dorsal view



***Todarodes sagittatus* (Lamarck, 1798)**

**Frequent synonyms / misidentifications:** *Loligo sagittata* Lamarck, 1798; *Ommastrephes sagittatus* Lamarck, 1798 / None.

**FAO names:** **En** – European flying squid; **Fr** – Toutenon commun; **Sp** – Pota europea.

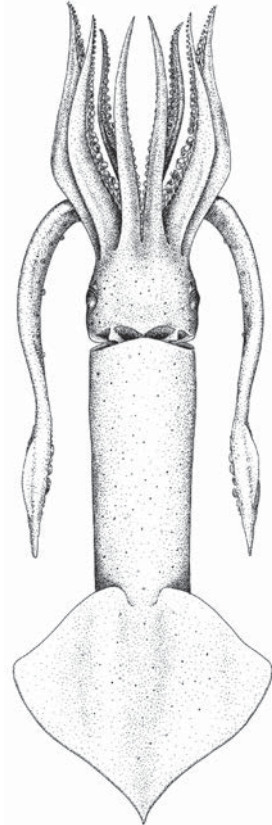


foveola



tentacular club

(all illustrations from Guerra, 1992)



dorsal view

**Diagnostic characters:** Funnel groove with foveola and without side pockets. Arms with 2 rows of suckers. Arm suckers with enlarged central tooth, 8 to 10 regular teeth and no small alternating teeth. Tentacular club with 4 longitudinal rows of suckers, the central rows being larger than the marginal ones; **tentacular club extending along stalk and occupying from 75 to 83% of the arm length; suckers on elongate carpus in 10 to 12 pairs.** No light organs on viscera.

**Size:** Maximum reported mantle length 750 mm but more often within the range 300 to 400 mm.

**Habitat, biology, and fisheries:** It is a typical neritic-oceanic species on the whole but its North African population has a shelf-slope lifestyle. Found at depths less than 50 to about 4 500 m. Undertake important vertical migrations from the bottom (day) to the surface (daytime). Also form large schools and undertake horizontal migrations. The spawning area in the northeastern Atlantic extends from 45°N to the Azores. Animals follow the main currents in these areas and they are transported towards Norway or to the south and remain concentrated above the thermocline (13°C in the north and 20°C in the south). Mature animals seem to distribute at lower depths. Spawning peaks takes place from late winter to spring in northern European waters, spring in southern European waters, from September to December in the Mediterranean Sea and in winter in North African waters. This species form a separate and isolated population that inhabits the outer shelf and upper slope waters off the coast of North west Africa between 10° and 26°N. The mantle length of mature males off Africa are 200 to 280 mm and females 250 to 350 mm mantle length, while in the North Atlantic, the mantle length of mature males and females are 270 to 400 mm and 360 to 750 mm, respectively. These, and other differences, suggest that the North African population of *Todarodes sagittatus* represents a separate population for fishery-biological management purposes. On the contrary, there are many similarities between *T. sagittatus* and *T. angolensis* from South Africa, nicely adapted to habitats of North and South upwelling systems. The life span is about 12 to 15 months. Potential fecundity ranges from 205 000 to

525 000 oocytes, egg size ranging from 1.0 to 1.2 mm in North African waters. Females grow faster than females in mantle length and weight but males attain maximal growth rates than females at a younger age than females. This species feed mainly upon fishes, euphausiids, amphipods, and other cephalopods, and it is an important prey for pelagic fishes and marine mammals. This species was extensively exploited in specific jigging fisheries of some north countries, particularly near the Norwegian coast with annual catches of about 22 000 tonnes before 1986; these catches were mainly used for bait in the cod fishery. In the North African waters, this species was targeted in summer time mainly by Soviet trawlers operating around the Cape Blanc area.

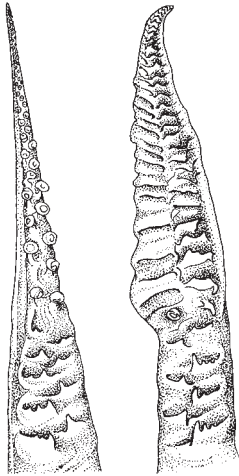
**Distribution:** Mediterranean Sea. Eastern Atlantic: entire area to approximately 40°W and from 11°N to the Arctic Ocean.



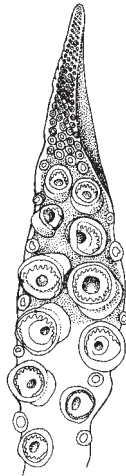
***Todaropsis eblanae* (Ball, 1841)**

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

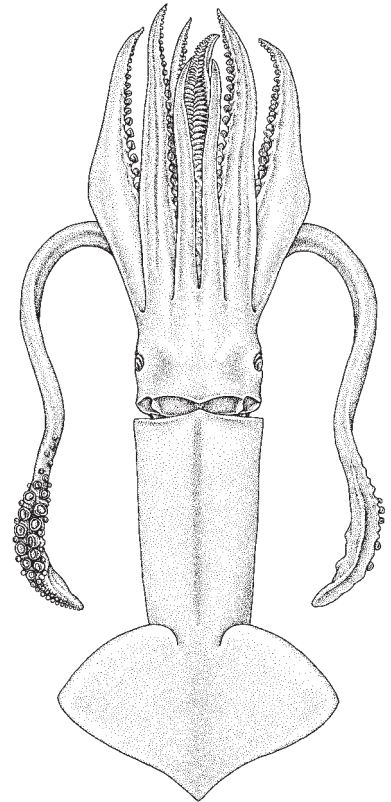
**FAO names:** En – Lesser flying squid; Fr – Toutenon souffleur; Sp – Pota costera.



hectocotylus



tentacular club



dorsal view

(illustration: K. Hollis/ABRS)

**Diagnostic characters:** Inverse T-shaped funnel cartilage. Funnel groove without foveola or lateral pockets. Head wide and robust with 4 folds in neck region. Rhomboid fins, which width range from 75 to 85% of the mantle length. Mantle width higher than 33% of the mantle length. Arms with 2 rows of suckers. **Dactylus of tentacular club with 4 longitudinal rows of minute subequal suckers.** Left and right ventral arms of male **hectocotylized by modification of suckers into cirrated lappets with transverse lamellae and expanded protective membranae.** Left and right ventral arms (IV) hectocotylized by modification of suckers into cirrate lappets with transverse lamellae and expanded protective membrane.

**Size:** Maximum mantle length 290 mm and 220 mm for females and males, respectively.

**Habitat, biology, and fisheries:** A demersal species associated to sandy and muddy bottoms mainly in lower sublittoral and upper bathyal over the continental shelf, not ascending to the surface or approaching the shore. Spawning season extends throughout the year with a clear peak in spring-summer and other less important in autumn. Fecundity was estimated to be from 5 000 to 123 000 oocytes. Mature oocytes diameters in the oviducts ranged from 1.0 to 1.8 mm. Eggs possibly laid near the bottom on the continental slope at midwaters. Sexual maturity starts at a larger size in females than in males. This species can be considered as intermittent terminal spawner. The maximum number of the spermatophores in the Needham sac was around 250, and it was observed that the number and the length of spermatophores tended to increase with the size of the males. Spent females were hardly found, which indicates that the degeneration process after spawning is extraordinarily fast. Males copulate several times, while spermatophores continued to be produced for further mating. Juveniles and adults have been collected at about 150 to 700 m, and they recruit to the fishery at 3 months of age, approximately. Its diet was composed by, in decreasing order of importance, fish, crustaceans and cephalopods. It was also noted the presence of cannibalism. Weight-at-length of mature males was greater than that of immature males and mature and immature females. Mantle length instantaneous relative growth rate ranged from 0.38 to 1.55% for males and from 0.43 to 1.74% for females. Its life span is about 1 year for males and females. Size at first maturity was 158 and 130 for males and females, respectively.

Growth rates in both sexes were dependent of the season of hatching. Growth rates are higher in later hatched individuals. This appears to be related with a gradual increase in water temperature during the spawning season. The abundance indices of this species off the northwestern Spain (30 to 500 m depth) related significantly with the upwelling index. This positive relationship could be due to the increased survival rate of hatchlings and prerecruits when abundance of prey augments, as consequence of higher productivity caused by upwelling. Individuals caught in fall cruises were mainly juveniles, indicating a strong autumn recruitment. This species is taken throughout the year as bycatch in otter trawl fisheries, and, in lesser extent, with gill and trammel nets, longlines and jigging in depths between 100 and 400 m in the Mediterranean, off West Africa and the northeastern Atlantic. No official statistics are available for this species.

**Distribution:** *Todaropsis eblanae* distribution extends over the Mediterranean Sea and eastern Atlantic from the Arctic to 36°S. Also present in the western Pacific Ocean, South China Sea and Australian waters.

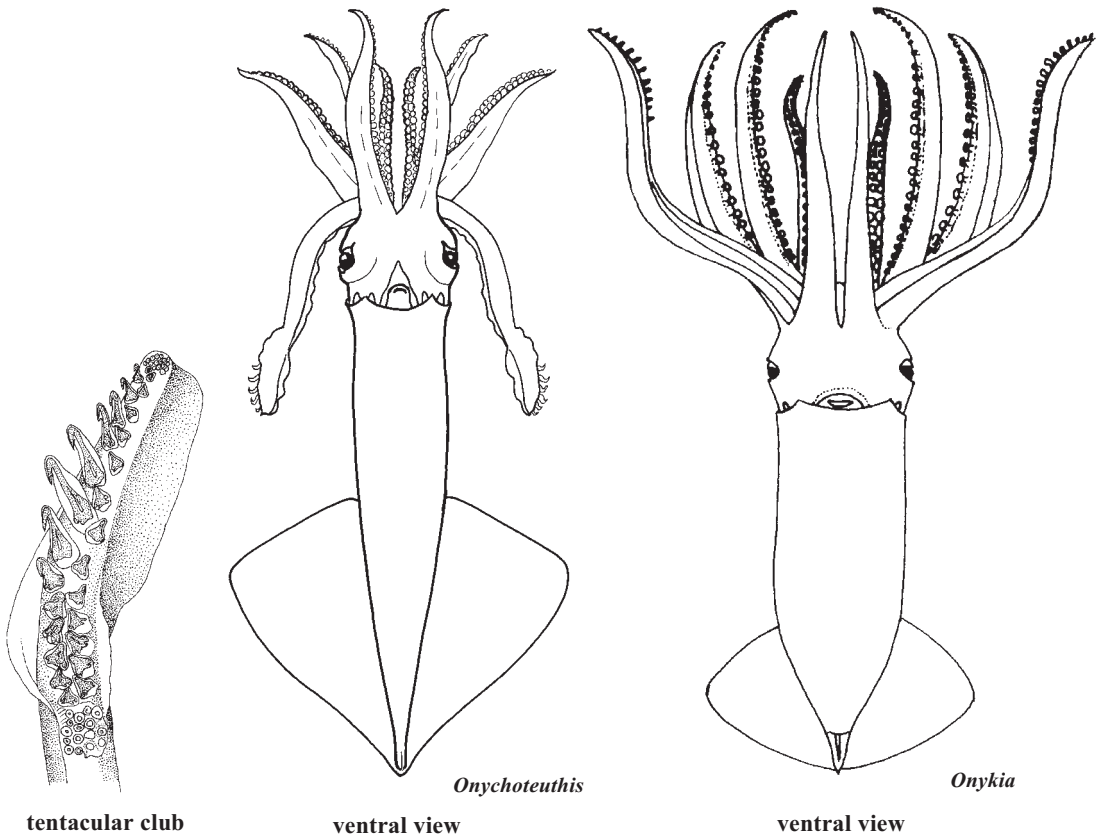




## ONYCHOTEUTHIDAE

### Clubhook squids

**Diagnostic characters:** Muscular squids. **Tentacle clubs with 2 rows of strong hooks** (with or without marginal suckers) on manus, well-defined discoidal locking apparatus on the carpus. Arm suckers biserial with smooth rings. **Neck often with numerous nuchal folds.** Buccal connectives attach to ventral side of ventral arms. Funnel locking apparatus straight and simple.



**Habitat, biology, and fisheries:** Some species are common in the open ocean (e.g. *Onychoteuthis* spp.); others live near the ocean floor along continental or island slopes (e.g. *Moroteuthis* spp.).

**Remarks:** The systematic of this family, still unstable, has undergone important changes in the last few years. Morphological characters of squids currently considered to be *Onychoteuthis banksii* are quite variable and it is likely that this “species” actually comprises a species-complex. Current thought consider *Moroteuthis* as a synonym of *Onykia* (e.g. Wakabayashi *et al.*, 2007, Vecchione *et al.*, 2007b, Bolstad, 2010). This issue was first addressed by Tsuchiya and Okutani (1992), but it has not been universally accepted afterwards (e.g. Nesis, 2000, 2002). According to a recent revision of the Onychoteuthidae by Bolstad (2010), *Walvisteuthis virilis* was removed from the family and it is considered species of unresolved status (Sweeney *et al.*, 2010). It is treated here in absence of further indications on a systematic placement.

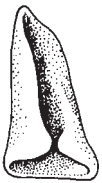
**Similar families occurring in the area**

Ommastrephidae: funnel-locking apparatus inverted T-shaped; tentacular clubs usually with 4, exceptionally with 8 (*Illex*) longitudinal rows of suckers at tips, no hooks; buccal connectives attached to dorsal borders of ventral arms.

Loliginidae: eyes covered with a transparent corneal membrane; tentacular clubs with no hooks.

Enoploteuthidae and Ancistrocheiridae: hooks on arms; light organs on surfaces of head and mantle.

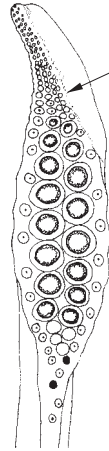
Pyroteuthidae: hooks on arms; light organs on tentacles.



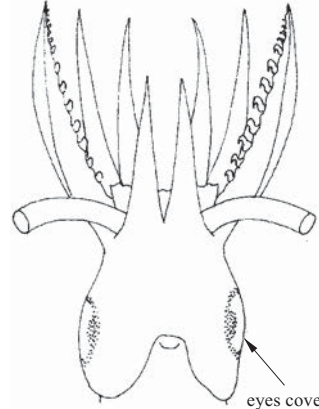
⊥-shaped  
Ommastrephidae  
types of funnel locking apparatus



simple, straight  
Onychoteuthidae,  
types of funnel locking apparatus



tentacular club  
Ommastrephidae



Loliginidae  
eyes covered with cornea

**Key to the species of Onychoteuthidae occurring in the area**

- 1a. Skin smooth; secondary occipital folds present . . . . . → 2
- 1b. Skin with warts; secondary occipital folds absent . . . . . **Onykia** → 3
  
- 2a. Two intestinal photophores, the anterior photophore close to the 75% diameter of the posterior one; ocular photophore a long patch on ventral surface of each eyeball . . . . . **Onychoteuthis banksii**
- 2b. No intestinal photophores . . . . . **Ancistroteuthis lichtensteinii**
  
- 3a. Fin much wider than long, their length up to 50% of mantle length; no tail . . . . . **Onykia carriboea**
- 3b. Fins realitively narrow, their length 60–70% of mantle length . . . . . **Onykia robsoni**

**List of species occurring in the area**

The symbol is given when species accounts are included.

- Ancistroteuthis lichtensteini* (Férussac, 1835).
- Onychoteuthis banksii* (Leach, 1817).
- Onykia carriboea* Lesueur, 1821.
- Onykia robsoni* (Adam, 1962).
- Walvisteuthis virilis* Nesis and Nikitina, 1986\* (see Remarks in the family).

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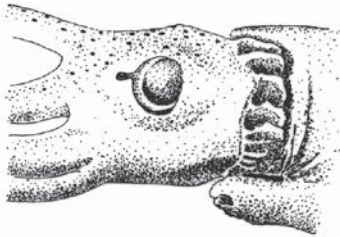
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***Ancistroteuthis lichtensteini* (Férussac, 1835)**

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

**FAO names:** En – Angel squid; Fr – Cornet archangel; Sp – Luria paloma.



nuchal folds



tentacular club

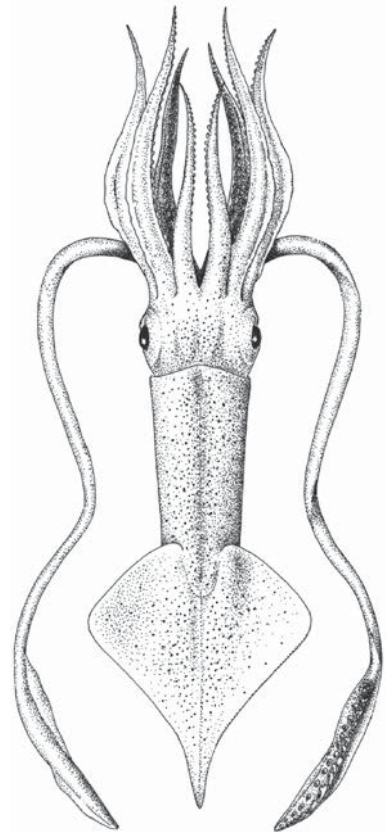
(all illustrations from Guerra, 1992)

**Diagnostic characters:** Mantle slender, muscular and pointed posteriorly, fins strong, lanceolated. From 6 to 10 nuchal folds present. Tentacular clubs in adults with 2 median manus series of 10 to 12 hooks each; lateral series of suckers absent. Carpal pad of club elliptical with 9 to 10 suckers and 9 to 10 pads. Rachis of pen visible along dorsal midline in adults but not in subadults. No light organs on intestinal tract; photogenic patch present on ventral surface of eyeball.

**Size:** Maximum mantle length 300 mm.

**Habitat, biology, and fisheries:** Its biology is poorly known. It is a pelagic species. Found from the surface to 1 300 m depth. In the Mediterranean it is associated with gravel bottoms during spring and summer and spawning occurs in summer. It feeds on epipelagic and upper mesopelagic finfishes and crustaceans, and is preyed upon by marine mammals and pelagic fishes. Of minor value for fisheries. All catches are taken by demersal and bottom trawls.

**Distribution:** In the eastern Atlantic, it has been reported from northwestern Spanish waters, Angola and Saharan Bank; Mediterranean Sea. Distribution appears very disjunct because only a few specimens have been reported in the scientific literature outside the Mediterranean. Also reported from the Gulf of Mexico and Melanesia, but these identifications are questionable.



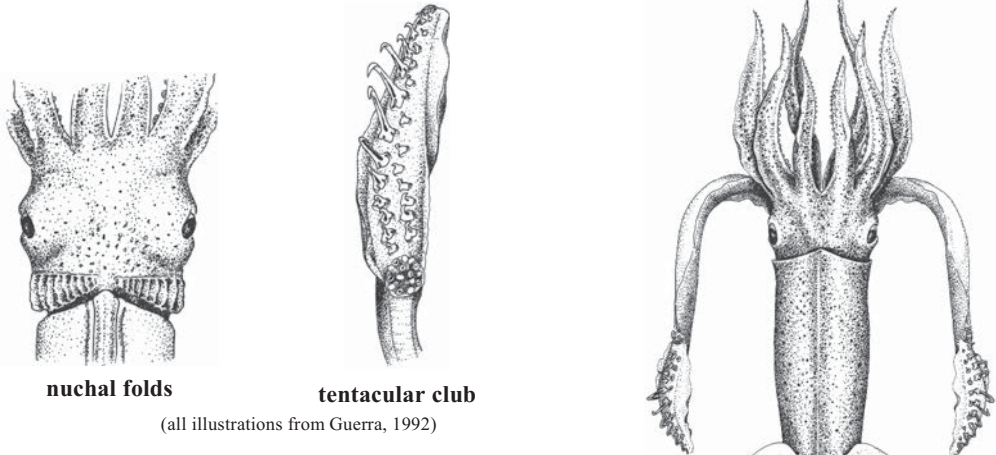
dorsal view



***Onychoteuthis banksii* (Leach, 1817)**

**Frequent synonyms / misidentifications:** *Chaunoteuthis mollis* Appelof, 1891; *Teleoteuthis caroli* Joubin, 1900 / None.

**FAO names:** **En** – Common clubhook squid; **Fr** – Cornet crochu; **Sp** – Luria ganchuda.



nuchal folds

tentacular club

(all illustrations from Guerra, 1992)

**Diagnostic characters:** Mantle muscular cylindrical and tail pointed. **Nine or 10 well-developed nuchal folds present.** Rhomboid muscular fins of about 50 to 60% of the mantle length, with sharp lateral angles. **The gladius is visible as a dark line through the skin along midline of mantle.** **Tentacles short with club with 20 to 22 large, claw-like hooks in 2 rows.** Clubs with a wide membrane, dactylus with 14 tiny suckers and carpus with a well-developed fixation apparatus consisting in 8 to 10 suckers and 7 to 9 pads. The manus of the tentacular club with hooks only. Arms robust with suckers disposed in 2 rows. **Two large, round, bulbous light organs along ventral midline on intestinal tract and 1 light organ in the ventral side of each eye.**

**Size:** Mantle length up to 300 mm (370 mm only in the northern Pacific Ocean, Nesis, 1987).

**Habitat, biology, and fisheries:** An oceanic species forming small schools. Most common from the surface to 150 m depth, occasionally found in deeper waters (1 record from 4 000 m depth). High respiration rates suggest it is fast-growing. Larvae and juveniles are abundant in the eastern Atlantic during winter and summer, which points out to an extended hatching season. It is important in the diet of several large fishes, cetaceans and seabirds. Currently, there is not directed fisheries, but is frequently caught as bycatch at night. The quality for human consumption is judged to be good.

**Distribution:** Cosmopolitan in warm and temperate oceanic waters.

**Remarks:** Until recently, *Onychoteuthis banksii* was thought to be a common circumglobal species, although the name, as generally applied, was suspected to encompass a species complex (e.g., Young, 1972, Kubodera *et al.*, 1998) Bolstad (2008) partially resolved the species complex in the Pacific Ocean, redescribing *O. banksii* from the Atlantic in the process. Subsequently, the same author sorted out another species, *O. horstkottei* (Bolstad, 2010), but it is likely that additional, still unrecognized species, exist.

dorsal view



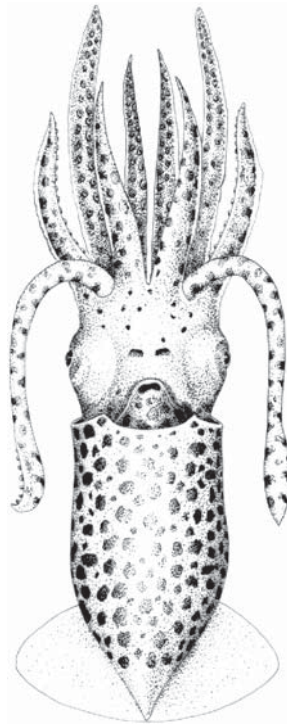
***Onykia carriboea*** Lesueur, 1821

**Frequent synonyms / misidentifications:** *Steenstrupiola atlantica* Pfeffer, 1884; *Teleoteuthis carriboea* Verrill, 1885; *T. jattai* Joubin, 1900 / None.

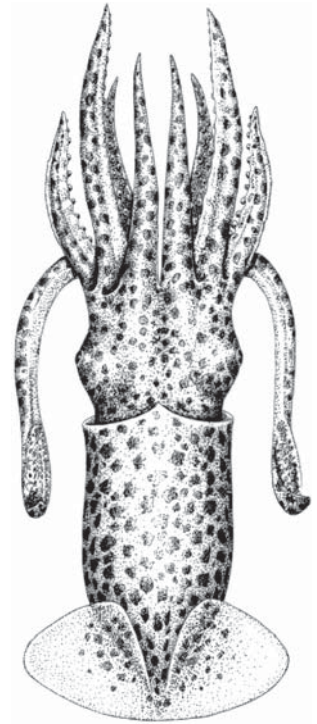
**FAO names:** **En** – Caribbean clubhook squid; **Fr** – Cornet crochu de Caraïbes; **Sp** – Luria ganchuda del Caribe.



tentacular club



ventral view



dorsal view

**Diagnostic characters:** Body muscular and cylinder-conical, slightly pointed posteriorly. **Fins much wider than long, their length up to 50% of mantle length;** arms with 2 longitudinal rows of suckers. Short tentacles. **Tentacle club poorly expanded with 2 rows of marginal suckers and 2 rows of hooks in the manus. Dorsally dark with bluish shade.**

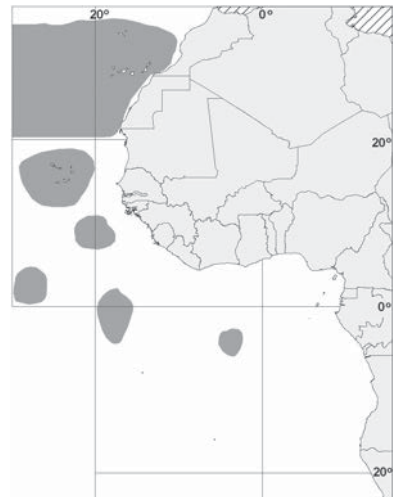
**Size:** Maximum mantle length possibly 145 mm.

(all illustrations from Guerra, 1992)

**Habitat, biology, and fisheries:** Tropical to warm temperate Atlantic and Indo-Pacific. Juveniles live near the surface, often in the hyponeuston, subadults in lower epipelagic and uppermost mesopelagic zones, not ascending to the surface (depth range from 0 to 200 m, 0 to 20 m day and night.). Known predators include *Alepisaurus ferox* (longnose lancetfish) and *Sthenoteuthis oualaniensis* (purpleback flying squid). Mature specimens not known. Not of interest to fisheries.

**Distribution:** Eastern central Atlantic from about Madeira to the Gulf of Guinea; northwest Atlantic from New England to Caribbean; central North Atlantic; northeastern Atlantic from Bay of Biscay to Azores; central South Atlantic; South and East Africa, central and eastern Indian Ocean, Japan, Hawaii, eastern and southwestern Pacific.

**Remarks:** *Onykia carriboea* is known, with certainty, only from small juveniles: no adult, mature specimen has been found/described. This suggests that the name could represent the immature growth stage of other onychoteuthid species (Kubodera *et al.*, 1998, Bolstad, 2007).



***Onykia robsoni*** (Adam, 1962)

**Frequent synonyms / misidentifications:** *Moroteuthis robsoni* Adam, 1962 / None.

**FAO names:** **En** – Rugose hooked squid; **Fr** – Cornet rugueux; **Sp** – Lurión rugoso.

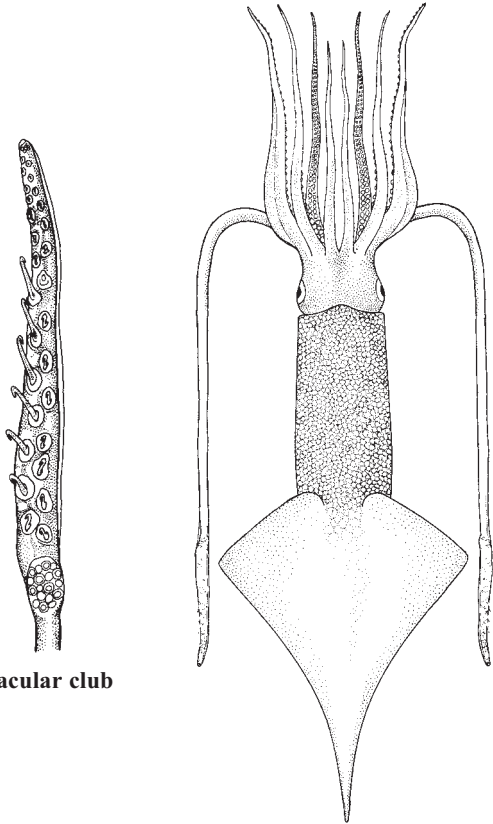
**Diagnostic characters:** Mantle firm, muscular, long and slender, covered with fleshy warts, reddish coloration, tip drawn out to a long, sharp tail. Tentacles present. Nuchal folds absent. Fins relatively narrow, their length about 60 to 70% of the mantle length, forming a very sharp pointed lanceolate tail, fin angle 30° to 40° each. **Tentacular clubs very narrow**, unexpanded, manus with 26 to 32 hooks in 2 median series. Arms attenuate, longest (IV) about 57 to 68% of the mantle length. Rostrum of gladius triangular in cross-section.

**Size:** Maximum mantle length 750 mm.

**Habitat, biology, and fisheries:** An oceanic species, taken with open nets. Its exact depth distribution is unknown; at least from 250 to 550 m. One of the squid species heavily preyed upon by sperm whales and large pelagic fishes. This species prey upon the euphausiid *Euphausia superba*.

**Distribution:** Circumglobal in southern subtropical and notalian pelagic regions.

**Remarks:** Its muscular tissues contains large amount of ammonium.



tentacular club

dorsal view





***Walvisteuthis virilis* Nesis and Nikitina, 1986**

**Frequent synonyms / misidentifications:** None / *Onykia rancureli* Okutani, 1981.

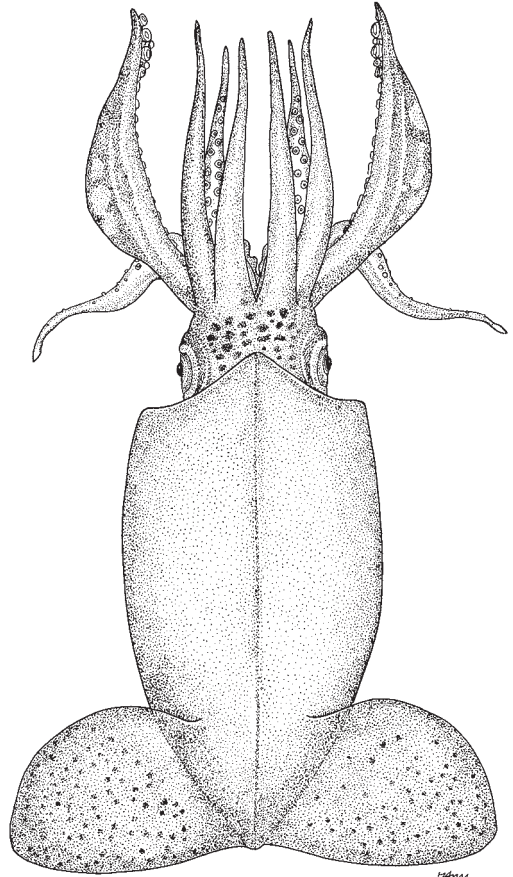
**FAO names:** En – Whale squid; Fr – Encornet baleine; Sp – Luria ballena.

**Diagnostic characters:** Tissues of semigelatinous consistence. Mantle smooth, broadly conical, bluntly rounded posteriorly, not drawn out into a tail. Fins very short, broad and oval, **width about 90% of mantle length**; posterior lobes meet in midline. Nuchal folds absent. Funnel-locking cartilage a simple, straight groove, slightly broader distally. **Arms short**, about half the mantle length; broad keel in distal portion. Arm suckers biserial, large, short-stalked, flattened, no hooks; **especially significant are the 3 or 4 pairs of greatly enlarged suckers on the midportion of arms III**, globe-shaped and twice as large as the normal suckers. Tentacles very thin and weak; club occupies more than half the tentacle length; carpus with well-developed, dispersed, locking apparatus, 8 or 9 suckers, less than half the diameter of the normal arm suckers; 5 or 6 pairs of minute, widely spaced, medial suckers in 2 series on long stalks on manus; a few marginal suckers may occur. No visceral photophores. Gladius with short, thin, blunt rounded rostrum oriented perpendicular to the gladius.

**Size:** Small-sized species; maximum mantle length to 103 mm.

**Habitat, biology, and fisheries:** Epipelagic to upper mesopelagic species. Paralarvae are known as small as 1.9 mm mantle length. None interest to fisheries.

**Distribution:** Worldwide in tropical to temperate seas.



dorsal view



**PYROTEUTHIDAE**

**Fire squids**

**Diagnostic characters:** Funnel-mantle locking apparatus a simple, straight groove and ridge. **Arms and tentacles with suckers and/or hooks arranged in 2 rows. Tentacular clubs without hooks. Large light organs on eyeballs and viscera;** no light organs on head, arms and mantle. Most easily recognized by the **sharply pointed “tail” and fins that are separate, each with a nearly circular outline.** They also have large buccal membranes with unusual attachments to the 4 dorsal arms. Peculiar tentacular bases have a permanent bend that presumably increase the degree of retraction (i.e. shortening) of the tentacles.

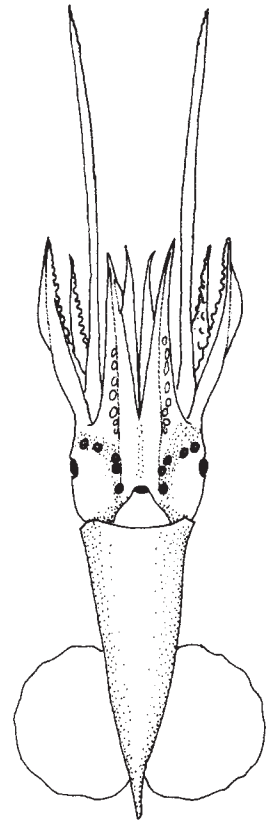
**Habitat, biology, and fisheries:** Small, muscular squids that occur in mesopelagic depths during the day and migrate into near-surface waters (0 to 200 m) at night. Among the more common squids in the midwaters of the open ocean. Where known, pyroteuthids feed on copepods and other small crustacea. Presumably, short-lived species. Mating and spawning have never been observed in members of this family. All members, however, have a specialized pouch located dorsal to the digestive gland and opening between the stellate ganglia. Spermatangia (discharged spermatophores) are commonly found attached to the opening of this pouch.

**Remarks:** Until recently, this family was considered to be a subfamily of the Enopteuthidae. Clarke (1988) erected a new family from this subfamily.

**Similar families occurring in the area**

Enopoteuthidae and Ancistrocheiridae have hooks on arms; light organs on surfaces of head and mantle but not on viscera.

Lycoteuthidae has hooks absent both in arms and tentacular clubs, which have quadriserial suckers; photophores present on eyeball and viscera and tentacles.




ventral view


**Key to the species of Pyroteuthidae occurring in the area**

- 1a. Tentacular clubs with hooks; 12 light organs on eyeball. . . . . *Pyroteuthis margaritifera*
- 1b. Tentacular clubs without hooks; 14 or 15 light organs on eyeball . . . . . *Pterygioteuthis* → 2
  
- 2a. Arms I-III middle sections with 2 to 8 hooks present only in the ventral row  
 . . . . . *Pterygioteuthis gemmata*
- 2b. Arms I-III middle sections with 2 to 5 pairs of hooks present in both ventral and dorsal  
 rows . . . . . *Pterygioteuthis giardi*

### List of species occurring in the area

The symbol  is given when species accounts are included.

 *Pterygioteuthis gemmata* Chun, 1908.

 *Pterygioteuthis giardi* Fischer, 1896.

 *Pyroteuthis margaritifera* (Rüppell, 1844).

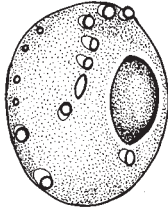
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*Pterygioteuthis gemmata* Chun, 1908

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

**FAO names:** **En** – Jewel fire squid; **Fr** – Encornet perle; **Sp** – Fuegoluria gemada.



light organs on eyeball

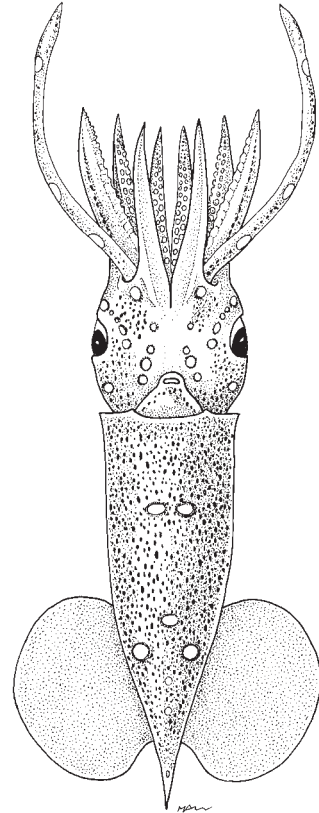
(all illustrations after Young, 1972)

**Diagnostic characters:** Arms I-III middle sections with 2 to 8 hooks present only in the ventral row. Arms IV with 2 rows of very small suckers. Hectocotylized arm (IV left) bearing to non-pigmented glandular areas of subequal length between which is located a comb-like plate with several conical teeth. Tip of the hectocotylized arm with few very tiny suckers. Fourteen (rarely 15) light organs on eyeball.

**Size:** Maximum mantle length 36 mm (sex unknown), 28 mm in males and 33 mm in females.

**Habitat, biology, and fisheries:** Mesopelagic ascending at night to the epipelagic zone. In the Gulf of Guinea paralarvae and small juveniles live in warm surface waters; juveniles >10 mm mantle length begin diurnal vertical migration. This species is apparently the shortest-lived and most rapidly maturing of oegopsid squids. Rather fast-growing, maximum age estimated at 78 days (30 mm mantle length, female); males live up to 75 days. Sexual maturity was reached at 50 days in males and 62 days in females. In the northwest Atlantic a peak of mature and maturing animals in spring indicate spawning in late spring or early summer; a peak of larvae and juveniles in autumn may produce a second spawning from early spring. In the Gulf of Guinea spawning is thought to occur in the upper epipelagic zone; hatching ranged from May to August, with a peak in July. Not of interest to fisheries.

**Distribution:** Morocco, Mauritania, Guinea Bissau, Gulf of Guinea, central Atlantic; South Atlantic North of Tristan da Cunha, Namibia, South Africa, southeast Indian Ocean; Gulf of Maine, Delaware Bay, Straits of Florida, Brazil; northeastern and southern Pacific.



ventral view



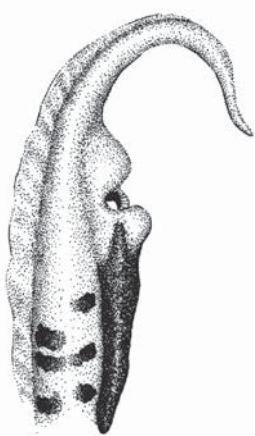
***Pterygioteuthis giardi* Fischer, 1896**

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

**FAO names:** **En** – Roundear enope squid; **Fr** – Encornet boubou; **Sp** – Enoploluria orejuda.



light organs on  
eyeball



hectocotylus



tentacular club

(after Guerra, 1992)



ventral view

**Diagnostic characters:** Arms I-III middle sections with 2 to 5 pairs of hooks present in both ventral and dorsal rows. Arms IV of females without suckers and 1 or 2 hooks in the IV arm of male. Hectocotylied arm (IV left) with 2 glandular areas of which, the proximal is bright orange-red and much longer than non-pigmented distal area. Two bent hook-like teeth between both areas. Fifteen light organs on eyeball.

**Size:** Up to about 40 mm mantle length.

**Habitat, biology, and fisheries:** In Hawaiian waters, this species vertically migrates from upper mesopelagic depths during the day to the upper 50 m at night. Off Bermuda most captures were from 50 to 100 m at night while the few daytime captures suggested a depth range from 327 to 475 m. In the eastern North Atlantic captures were made mostly at 300 to 400 m during the day and 50 to 200 m at night. Eggs are small (about 0.7 mm) but large in comparison to the small size of the spawning females. The oviduct holds only a few eggs (e.g. 11 in a 21 mm ML female). Presumably eggs are spawned in small batches and at frequent intervals due to the small storage capacity. The age at maturity and life span are unknown. Not of interest to fisheries.

**Distribution:** This species was first described from the North Atlantic off Morocco (Fischer, 1896). It is the most widely distributed member of the Pyroteuthidae. Tropical-subtropical cosmopolitan species.

**Remarks:** Recent investigation (Lindgren, 2010) uncovered notable differences between the 2 subspecies *Pterygioteuthis giardi giardi* and *P. giardi hoylei* (Pfeffer, 1912), leading to the elevation of *P. hoylei* to specific status.



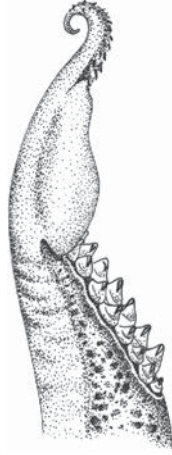
***Pyroteuthis margaritifera* (Rüppell, 1844)**

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

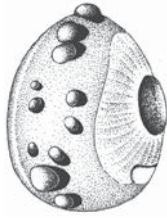
**FAO names:** En – Jewel enope squid; Fr – Encornet-bijouter; Sp – Enoploluria joyera.



hectocotylus



tentacular club



light organs on eyeball

(after Guerra, 1992)



dorsal view

(after Okutani, 1995)

**Diagnostic characters:** Longitudinal membrane of hectocotylus about 33% of arm length measured from first hook; membrane starting after seventh to ninth pair of hooks. Usually no additional small light organs on tentacular stalk between the first and the second light organs. Both dorsal arms (I) bearing 12 pairs of hooks and 10 to 12 pairs of suckers on the apex; arms II with 4 suckers on the base followed by 9 pairs of hooks and 2 small suckers on the apex, arms III with 9 or 10 pairs of hooks and 2 small suckers on the apex; arms IV with 14 pairs of hooks and 7 pairs of suckers on the apex.

**Size:** Maximum mantle length 50 mm.

**Habitat, biology, and fisheries:** Mesopelagic in the tropical and temperate Atlantic and Indo-West-Pacific Oceans. The only known predator is *Alepisaurus ferox* (longnose lancetfish). Not of interest to fisheries.

**Distribution:** Madeira, Morocco, Canary Islands, Mauritania; Mediterranean; Nova Scotia to Brazil; South Atlantic and southern Africa to southeastern Indian Ocean; southwestern and central Pacific.



## THYSANOTEUTHIDAE

### Rhomboid squids, diamondback squids

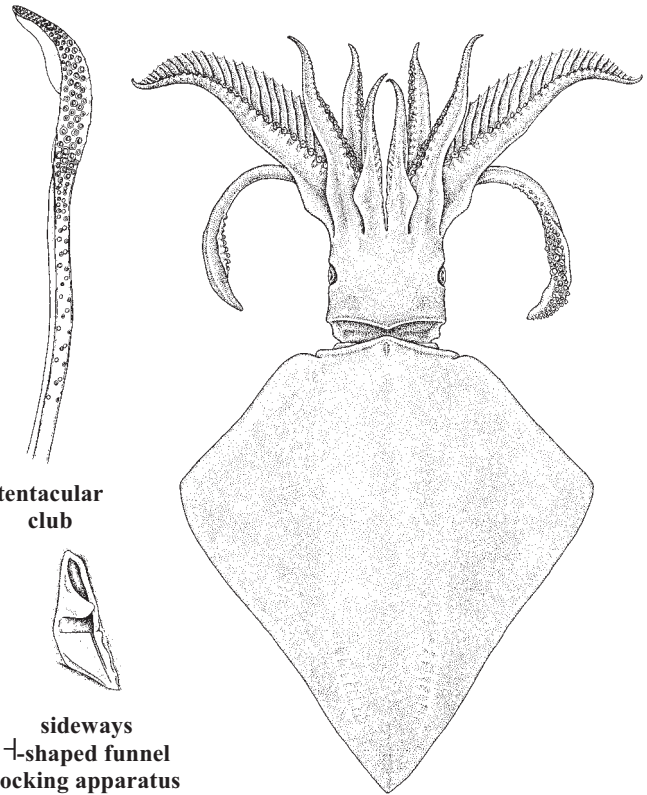
This monotypic family contains a single species. Consequently, diagnostic characters, habitat, biology and interest to fisheries coincide.

*Thysanoteuthis rhombus* Troschel, 1857

**Frequent synonyms / misidentifications:** *Cirrobrachium filiferum* Hoyle 1904; *C. danae* Joubin, 1933 / None.

**FAO names:** **En** – Diamondback squid; Rhomboid squid; **Fr** – Chipiloua commun; **Sp** – Chipirón volantin, Calamar losange.

**Diagnostic characters:** Mantle thick, muscular, tapering to a blunt tip posteriorly. **Fins long, broad, rhombic, occupying entire length of mantle, their width 70% of mantle length. Mantle-funnel locking apparatus sideways T-shaped.** Nuchal cartilage with 2 projections entering grooves on anterior edge of mantle. Tentacular clubs with 4 rows of suckers. Fixing apparatus present on tentacles. Arms short with 2 rows of suckers and highly developed protective membranes expanded into long cirri-like trabeculae. Buccal connectives attached to ventral borders of arms IV. Left ventral arm of males hectocotylized. Light organs absent.



tentacular club

sideways T-shaped funnel locking apparatus

(illustration: K. Hollis/ABRS)

dorsal view

#### Similar families occurring in the area

Other families also have species with fins extending the entire length of the mantle (e.g. Mastigoteuthidae, Ancistrocheiridae, Cycloteuthidae); all can easily be eliminated, however, by the distinctive funnel locking apparatus peculiar to the Thysanoteuthidae.

**Size:** Maximum mantle length 100 to 130 cm; maximum total weight about 25 to 30 kg.

**Habitat, biology, and fisheries:** An epipelagic, oceanic species. Its distribution and migration is related to surface circulation of oceanic currents. Found from surface to 750 m, especially 450 to 650 m. This species is characterized by low population densities and appears to have a unique social organization for squids: they live a great part of their life cycle in couples of 1 male and 1 female of similar size. Males are more precocious than females; mature males were observed at 39 cm mantle length aged 150 to 170 days, whereas females' maturation occurred later, at 50 to 62 cm mantle length (215 to 240 days). Although females have a high potential fecundity (up to 4.8 millions of oocytes) their eggs masses contain from 24 000 to 76 000 eggs. This indicated that spawning is intermittent. Egg masses are planktonic and they have been found drifting in the surface layers in different geographic areas. The egg masses are dense, gelatinous, oblong cylinders with rounded tips and their maximum length and diameter range from 600 to 1 800 mm and 100 to 300 mm, respectively. The spawning season of this species extends throughout the year in tropical waters (sea surface

temperature 23 to 26°C) but from January to September, with peaks in March and May, in peripheral regions. The average mantle length of the planktonic paralarvae ranges from 1.6 to 2.0 mm. This species has one of the fastest growth rates among squids; by an age of 300 days they reached 750 to 800 mm mantle length. Its life span is estimated to be about 1 year. Predators included sperm whales, sword fish, tuna and blue marlin. The species has been found dying in nearshore waters or stranded ashore at the outer edges of the species range. This species has commercial importance mainly in Japan where it is caught by small vessels using drifting jigs, setnets and longlines. It is consumed fresh and frozen.

**Distribution:** Cosmopolitan in warm and warm temperate waters, between approximately 50°N and 50°S, including the Mediterranean Sea.



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## VAMPIRES

### VAMPYROTEUTHIDAE

#### Vampire squids

A single species in the family.

*Vampyroteuthis infernalis* Chun, 1903

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

**FAO names:** **En** – Vampire squid; **Fr** – Calmar vampire; **Sp** – Calamar vampiro.

**Diagnostic characters:** Medium size gelatinous animals. Mantle widely conical, fused with the wide head in the occipital area without nuchal constriction. Mantle opening wide. Eyes large, without sinus. No buccal membrane, funnel completely embedded in the tissue of ventral side of head. **Two large composite light organs of facet structure are located dorsally in posterior part of mantle on sides midline behind the fins.** The second pair of arms is modified into retractile filaments, presumable with sensory function; they can extend in length in excess of the total animal length and can be retracted into pockets within the web. **Eight arms short, connected by a deep web, with 1 row of suckers and 2 rows of short cirri on both sides of suckers.** Mantle and outer side of arms dark violet or dark purple, while inner side of arms velvet black.

**Similar families occurring in the area**

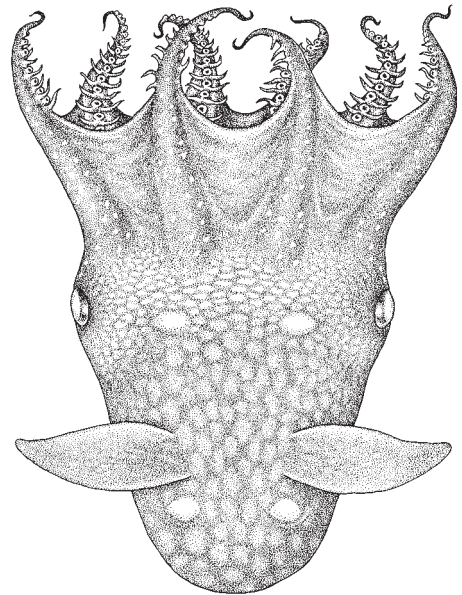
None.

**Size:** Up to 130 mm mantle length.

**Habitat, biology, and fisheries:** Bathypelagic species, descending also to the abyssopelagic zone. Lives mainly at depths of 700 to 1 500 m, although the juveniles can be found sometimes between 300 and 350 m depth. Not gregarious animals. They do not perform important diel vertical migrations and their movements resemble the ones undertaken by cirrate octopods. This species lacks sexual dimorphism. Probably swim with their head down. Eggs are large 3 to 4 mm in diameter, shed singly into the water. The larvae resemble adult specimen. *Vampyroteuthis infernalis* has little capacity for jet propulsion and has the lowest metabolic rate ever measured for a cephalopod. Of no importance for the fisheries.

**Distribution:** Cosmopolitan in tropical and subtropical waters.

**Remarks:** Fin development in vampire squids is unique among cephalopods; the pair of fins present at hatching, in fact, is eventually reabsorbed and replaced by another pair, more anterior, as development proceeds. Therefore, at a certain stage of development, animals have 2 pair of fins. This unusual fin ontogeny is partially responsible for the early description of 3 families and many species, where only 1 species exists (Young, 2012).



(illustration: K. Hollis/ABRS)



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## Cirrate OCTOPODS

### CIRROTEUTHIDAE

#### Cirroctopods

**Diagnostic characters:** Small-to-large cirrate octopods (maximum known ML 330 mm; total length: 1 700 mm), with extended bell-shaped body. **Web or umbrella complex, with secondary web** linking arms to primary web. Digestive gland entire. **Cirri extremely long.** **Gill form sepioid.** Without radula and posterior salivary glands.

**Habitat, biology, and fisheries:** Benthic to benthopelagic range animals. Occurs in depths from 200 to 5 000 m. Little is known about habitat preferences, and many aspects of the biology of these deep-sea cephalopods are poorly known and understood. Males produce small spermatophores (or 'sperm packets') characteristic of the cirrate octopods, located in the seminal vesicle and terminal organ. There is a continuous production of eggs and spermatophores over the adult life span. Fertilization is internal and the eggs are incapsulated. Growth is slow and the life cycle may last several years. Finned octopods prey mainly upon suprabenthic and benthopelagic crustacean and polychaetes. Known predators: Patagonian toothfish (*Dissostichus eleginoides*), different species of sharks, fur seals and sperm whales. They show different aptitudes and modes of locomotion. Of no interest to fisheries.

#### Similar families occurring in the area

Opisthoteuthidae: differ from Cirroteuthidae in having a simple web (so lacking of secondary web or umbrella), because they have short cirri, gills are 'half-orange' in form and the fins are small and subterminal.

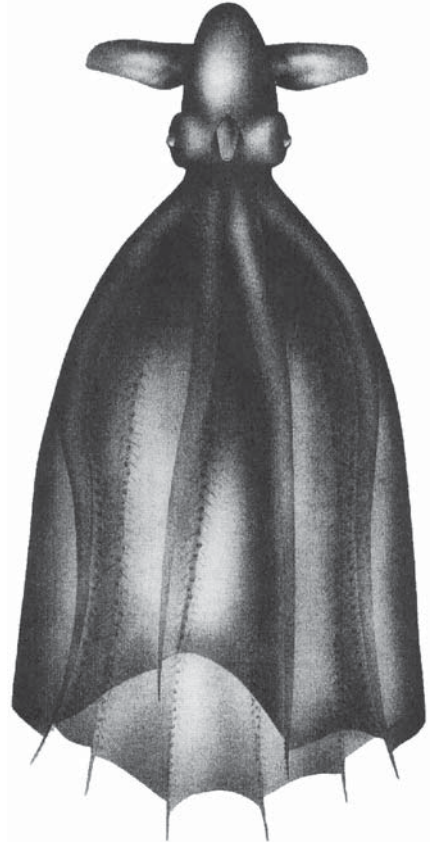
#### List of species occurring in the area

The symbol 🦑 is given when species accounts are included.

🦑 *Cirrothauma magna* (Hoyle, 1885) .

#### Remarks

It is possible that the blind cirrate octopod *Cirrothauma murrayi* Chun, 1911 is present in the area. However, the assumed worldwide distribution of this species requires a deep review.



(from Guerra, 1998)

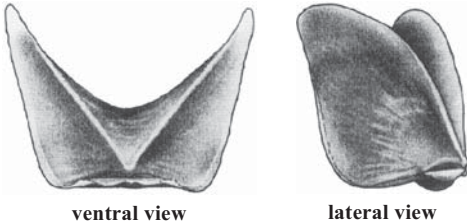
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***Cirrothauma magna* (Hoyle, 1885)**

**Frequent synonyms / misidentifications:** *Cirroteuthis magna* Hoyle, 1885 / None.

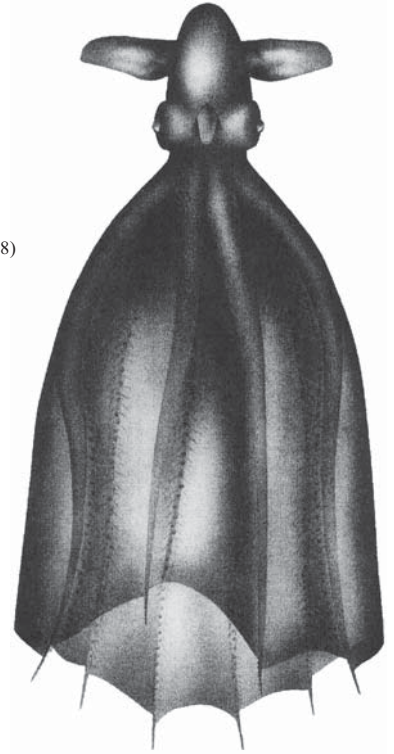
**FAO names:** **En** – Large cirroctopod; **Fr** – Grand cirropoulp; **Sp** – Gran cirropulpo.



**internal shell**

(all illustrations from Guerra, 1998)

**Diagnostic characters:** **Body gelatinous.** Mantle short, oblong, relatively elongated and gently rounded posteriorly. Mantle aperture narrow and slightly larger than base of funnel, which is relatively long. **Fins paddle-shaped large and wide, slightly longer than the interocular width.** Very voluminous eyes with large lenses. Arm length 73 to 79% of the total length. Primary web inserting at different levels on the oral and aboral ends of dorsolateral (II) and ventrolateral (III) arms on both sides, and at the same levels on both ends of the dorsal and ventral arms (I and IV). Each arm is not directly connected to the primary web except at its distal margin and at the base of the arms, but each arm is connected with the **primary web by an intermediate or secondary web** that is attached along the aboral side of the arms; absence of a nodule at the fusion point of both webs. Very long not retractile cirri; the first cirri commence between the fourth and fifth suckers. Three type of suckers on the arms: cylindroconical form and those with the acetabulum highly deformable on the first two-thirds and barrel-shaped on the rest of the arm; no enlarged suckers in male or females. **Butterfly-like internal shell**; shell width index 26 to 31. Between 5 and 6 gill lamellae per outer demibranch.



**Size:** Maximum mantle length 350 mm.

**Habitat, biology, and fisheries:** Deep-sea benthopelagic octopods inhabiting abyssal ecosystems and ascending in the upwelling off Cape Blanc (central-east Atlantic). Found at depths from 1 350 to 3 350 m. These gelatinous animals are neutrally buoyant. They can be considered abyssopelagic octopods, although they can also rest on the bottom, where they probably feed. This species, and other related ones, have been observed to swim between 2.2 km h<sup>-1</sup> and 0.46 km h<sup>-1</sup> using the fins. A ballooning response was observed in a high-stress situation when 1 specimen was captured. The spermatozooids are in the interior of typical structured called "sperm sacs". The ovary of the gravity female caught was enormous (100 x 80 mm) and it was full of practical spherical oocytes of different sizes, up to 11 mm in diameter. No interest to fisheries.

**Distribution:** Only 4 specimens have been described: a female captured at 45° 46'S, 45° 31'W between Price Edward and Crozet Islands; a female caught at 23°00'N–17°34' (eastern Atlantic Ocean), a male collected at 17°28.75'N–46°33.36'W (central Atlantic Ocean), and a female on the Cape Verde Terrace off the west African coast. Central-East Atlantic Ocean.

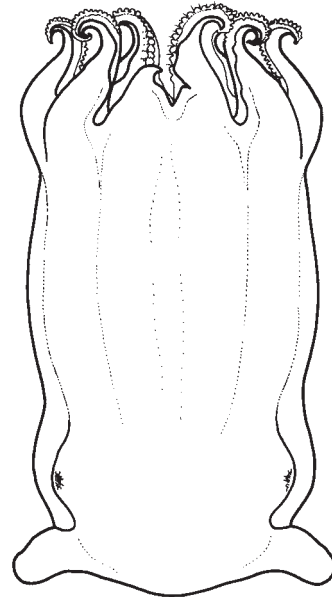


**OPISTHOTEUTHIDAE**

**Flapjack octopods**

**Diagnostic characters:** Moderate-sized **gelatinous** cirroctopods with small, subterminal fins. **Shell a flaring U-shape, lateral walls tapering to fine points**; optic nerves pass through white body in 2 to 4 bundles. **Two fields of enlarged suckers in mature males**. Digestive gland entire or bilobed. Radula and posterior salivary glands absent. **Web deep, single**. Gills of 'half-orange' from.

**Habitat, biology, and fisheries:** Benthic animals. Found from 152 to 2 287 m. Males have enlarged modified suckers of unknown function, in 1 or 2 fields from 1 to all arm pairs, a character absent in females. Enlargement of suckers discriminates between mature and immature males. Males produce small spermatophores or 'sperm packets'. There is a follicular sheath around each maturing egg that remains attached to the ovary after mature eggs are released into the proximal oviduct. Absolute fecundity is relatively low (no more than 3 300 eggs per individual). Fertilization is internal. The fertilized eggs are large and encapsulated; the egg capsule, produced by the oviducal gland, is hard. Mating behaviour is unknown. Flapjack octopods have a single, extended and continuous period of egg maturation and spawning, which occupies a long period of their life span. This seems to be an adaptation to non-seasonal deep-sea environments. Some species attach their eggs to substrata fixed onto the bottom. The duration of the embryonic development is unknown. These octopods prey upon different species of polychaeta and suprabenthic crustaceans. The cirri play an important role in chemo- and mechanoreception. Several attitudes and locomotion modes have been described. Main predators are deep-sea sharks, teleostean fishes and marine mammals. Members of this family seem to have low growth rates and life span of several years, adapted to cold deep-sea waters. Of no interest to fisheries.



**dorsal view**


**Similar families occurring in the area**

Cirrotheutidae differ from Opisthoteuthidae in possessing a complex (secondary) web and extremely long cirri.

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

- 1a. Fin of proximately the same length as mantle length; optic lobe circular in cross section; sucker in males not greatly enlarged and do not form 2 fields . . . . . **Grimpoteuthis**
- 1b. Fin length approximately half of mantle length; optic lobe kidney-shaped in cross section; arms of males generally with modified suckers in 2 clear fields (proximal and distal) . . . . . **Opisthoteuthis**

**List of species occurring in the area**

The symbol  is given when species accounts are included.

-  *Grimpoteuthis boylei* Collins, 2003.
-  *Grimpoteuthis wuelkeri* (Grimpe, 1920).
-  *Opisthoteuthis calypso* Villanueva, Collins, Sánchez and Voss, 2002.
-  *Opisthoteuthis grimaldii* (Joubin, 1903).
-  *Opisthoteuthis massyae* (Grimpe, 1920).

**Remarks:** No key to species are presented due to the complexity of the characters and the absence of females in 1 species.

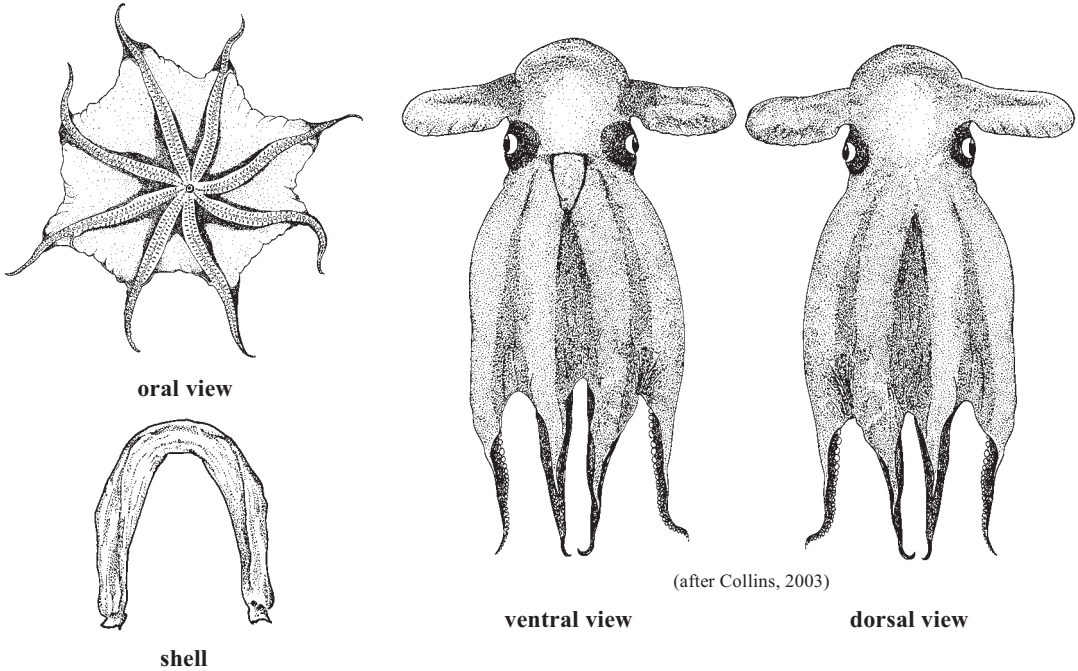
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***Grimpoteuthis boylei* Collins, 2003**

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

**FAO names:** **En** – Boyle's flapjack octopod; **Fr** – Discopoulpe de Boyle; **Sp** – Discopulpo de Boyle.



**Diagnostic characters:** Cirri long and suckers large (52 to 58% head width), cylindrical; area where suckers are largest (maximum diameter) at web margin. Gills large, with 7 or 8 broad lamellae. Radula present; teeth homodont. Posterior salivary glands present. **Fin-supporting cartilage (shell) U-shaped, smooth, with distinct depression in the posterior surface of the basal portion; outer edges of lateral walls parallel, with blunt termination.**

**Size:** Maximum mantle length 115, total length 440 mm (female).

**Habitat, biology, and fisheries:** Abyssal species. Found at depths from 4 000 to 4 900 m. Of no interest to fisheries.

**Distribution:** From the Porcupine Seabight and Madeira Abyssal Plain. Probably distributed from 20° to 50°N in the northeast Atlantic.

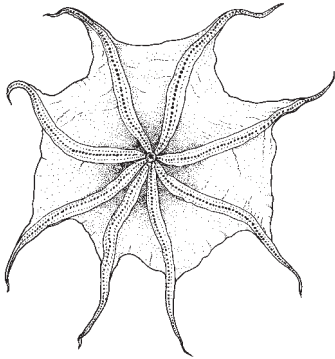




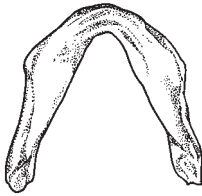
***Grimpoteuthis wuelkeri* (Grimpe, 1920)**

**Frequent synonyms / misidentifications:** *Stauroteuthis wuelkeri* Grimpe, 1920; *Cirroteuthis umbellata* (Chun, 1913; in part); *Stauroteuthis umbellata* (Ebersbach, 1915); *Enigmatiteuthis wulkeri* (O'Shea, 1999) / None.

**FAO names:** **En** – Wülker's flapjack octopod; **Fr** – Discopoulpe de Wülker; **Sp** – Discopulpo de Wülker.

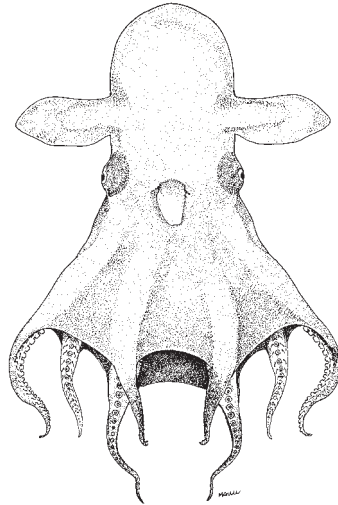


oral view

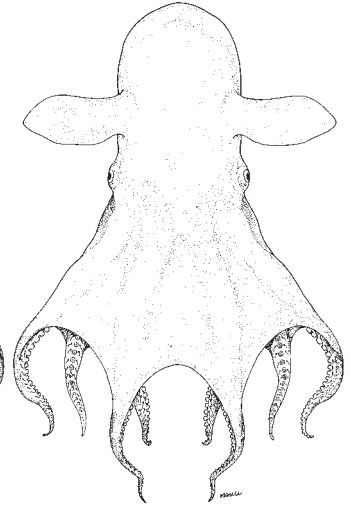


(after Collins, 2003)

shell



ventral view



dorsal view

(after Collins, 2003)

**Diagnostic characters:** Cirri short. From 60 to 70 suckers deeply embedded in each of the arms, with suckers large present over broad range of arms. Radula present, all teeth homodont (equals). Posterior salivary glands small. **Shell U-shaped, robust, with thickened basal portion and fin attachment area strengthened; lateral wings terminate in 2 lobes, one of which extends to fine point;** gills large, with 6 or 7 broad lamellae.

**Size:** Maximum mantle length known 115 mm, total length 400 mm (females).

**Habitat, biology, and fisheries:** Abyssal species. Known from 1 500 to 2 500 m. Egg length 14 mm. No other information is available on the biology of this species. Of no interest to fisheries.

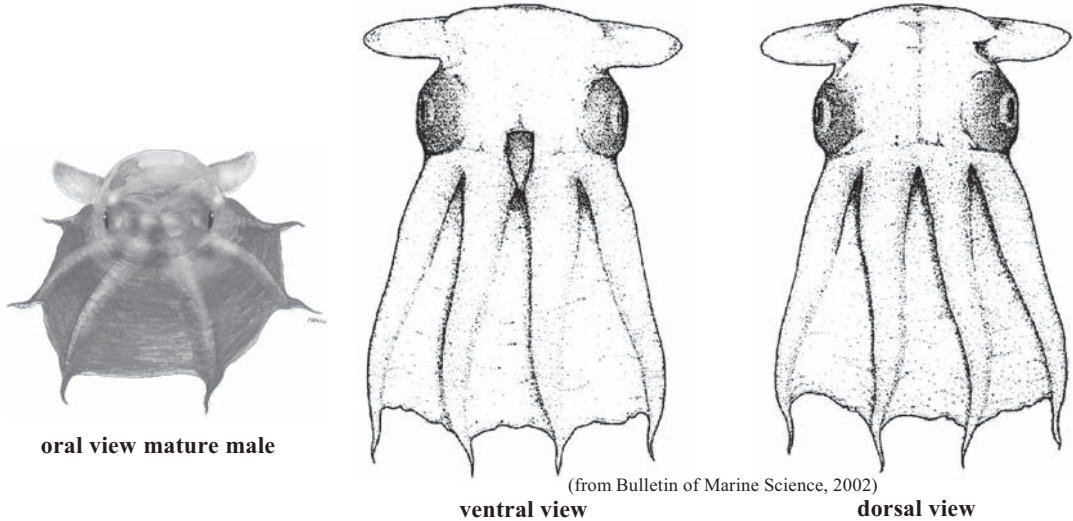
**Distribution:** Northwest and northwest Atlantic. the type locality is located off the coast of Morocco.



***Opisthoteuthis calypso*** Villanueva, Collins, Sánchez and Voss, 2002

**Frequent synonyms / misidentifications:** *Opisthoteuthis agassizii* (non Verrill, 1833) / None.

**FAO names:** **En** – Calypso flapjack octopod; **Fr** – Discopoulpe de Calypso; **Sp** – Discopulpo de Calypso.



**Diagnostic characters:** No increased robustness of arm I in mature male. From the ventral margins of all the arms, a single muscular nodule extends into the web to its outer edge at the approximate level of the maximum depth of the web between arms, typically at suckers 22 to 27. **In mature males, sucker enlargement in proximal field greatest on arm III. The distal enlarged sucker field comprises 2 or 3 (exceptionally 4) contiguous suckers, usually beginning at about sucker 23 to 24 with sucker 26 largest.** In mature males, maximum distal enlarged sucker diameter equals or exceeds that of proximal enlarged suckers. **Sucker enlargement in distal field greatest on arm III and IV. First cirrus usually occurs between suckers 1 and 2.** Basal portion of the shell slightly concave outer surface and convex inner surface. Eggs relatively small; eggs from oviducal gland and distal oviduct range in height between 5.1 (in the oviducal gland) and 7.5 mm (in the distal oviduct).

**Size:** Total length in males 482 mm (5 400 g of total weight) and 342 in females (1 650 g total weight).

**Habitat, biology, and fisheries:** Benthic species inhabiting muddy bottoms from 365 to 2 208 m depth. In the southeastern Atlantic it was collected by trawl at densities of 6 to 23 individuals per km<sup>-2</sup> with no difference between day and night abundance. Animals feed upon small epibenthic and suprabenthic crustaceans and polychaetes. Predators are unknown. Mature individuals of both sexes are collected in all seasons of the year. All males from 95 to 5 400 g total weight and females from 190 to 1 650 g are mature, indicating that considerable growth take place after onset of sexual maturity. Egg production is continuous over the entire adult life span. Of no interest to fisheries.

**Distribution:** Mediterranean and eastern Atlantic, from Ireland to Namibia and possibly South Africa.

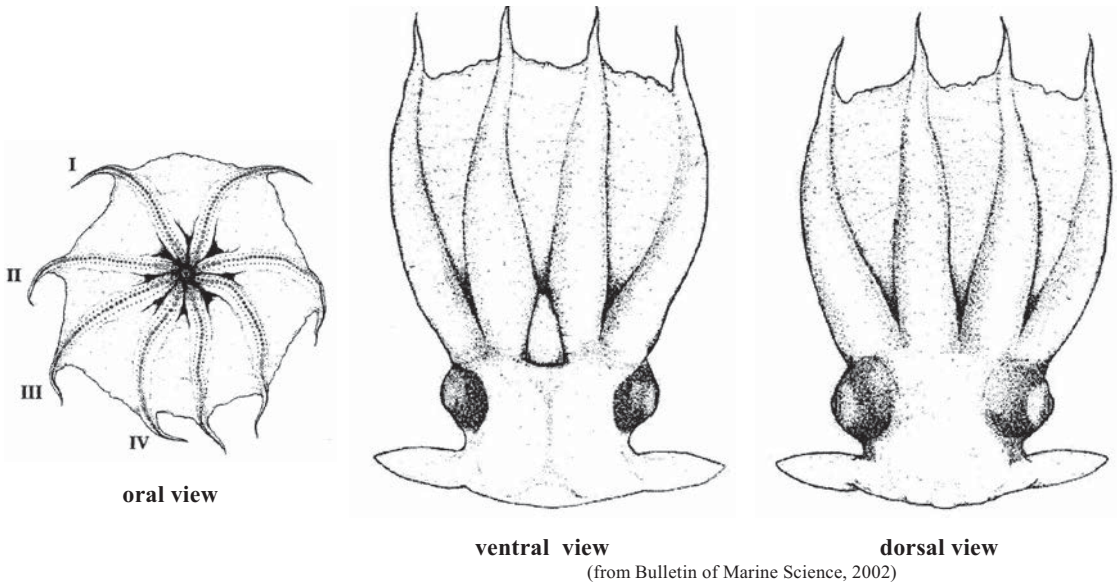
**Remarks:** Several authors identified specimens from the Mediterranean, North Atlantic and central-east Atlantic as *Opisthoteuthis agassizii*. However, these records belong to *O. calypso*.



***Opisthoteuthis grimaldii*** (Joubin, 1903)

**Frequent synonyms / misidentifications:** *Cirrotheuthis grimaldii* Joubin, 1900; *Grimpoteuthis grimaldii* (Joubin), Robson, 1932; *Opisthoteuthis grimaldi* (Joubin), Voss, 1988 / None.

**FAO names:** **En** – Grimaldi's flapjack octopus; **Fr** – Discopoulpe de Grimaldi; **Sp** – Discopulpo de Grimaldi.



**Diagnostic characters:** No increased robustness of arm I in mature male. From the ventral-lateral margins of all the arms, a single muscular nodule extends into the web to its outer edge at typically occurs at the level of suckers 25 to 30, and 1 to 4 suckers prior to the enlarged distal sucker. **In mature males, sucker enlargement in proximal field greatest on arm III. The distal enlarged sucker field in mature males is less than proximal. The distal enlarged fields typically comprises 9 or 10 suckers, usually beginning at about sucker 22 to 31 and ending at sucker 31 to 39, with suckers 29 to 31 usually largest. The sucker enlargement in distal field is approximately equal on all arms.** First cirrus usually occurs between suckers 2 and 3. Basal portion of the shell with essentially flat outer surface and convex inner surface.

**Size:** Up to 54 mm mantle length. At present known only from mature male specimens.

**Habitat, biology, and fisheries:** This is a benthic species inhabiting muddy bottoms. Found at depths from 1 135 to 2 287 m, probably the deepest occurring *Opisthoteuthis* in the Atlantic. Its biology is unknown. Of no interest to fisheries.

**Distribution:** Known for certain only from the eastern Atlantic: Rockall Through, Açores islands and off Cape Blanc in the North Atlantic; off Namibia in the South Atlantic. Possible presence off northwest of Bermuda.

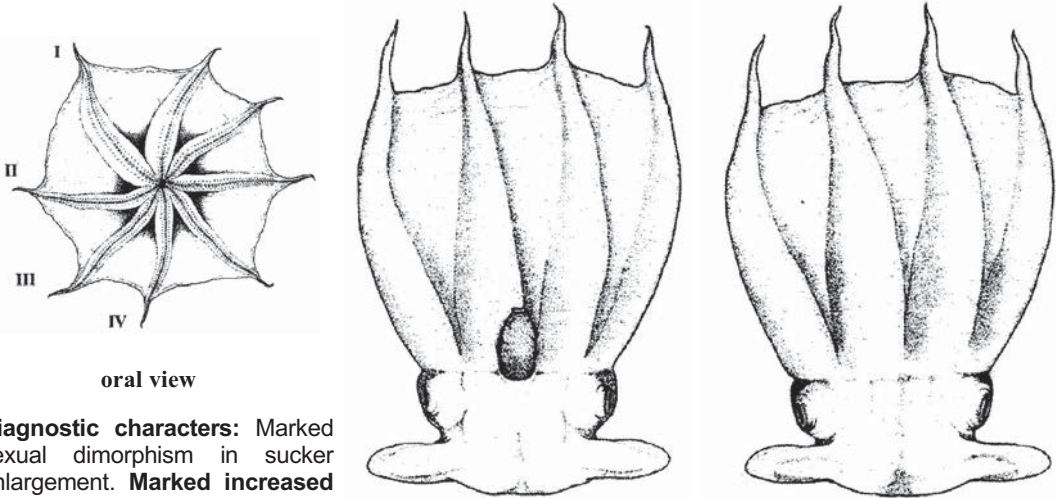
**Remarks:** The diagnosis is based on mature male specimens. No females have been unquestionably identified to this species.



***Opisthoteuthis massyae* (Grimpe, 1920)**

**Frequent synonyms / misidentifications:** *Cirroteuthis umbellata* Massy, 1909; *Cirroteuthopsis massyae* Grimpe, 1920; *Opisthoteuthis vossi* Sánchez and Guerra, 1989 / None.

**FAO names:** **En** – Massy's flapjack octopod; **Fr** – Discopoulpe de Massy; **Sp** – Discopulpo de Massy.



(from Bulletin of Marine Science, 2002)

ventral view

dorsal view

**Diagnostic characters:** Marked sexual dimorphism in sucker enlargement. **Marked increased thickness of arms I in mature male.** A series of muscular, web supports, of which proximal support is stout and more distal ones weak, extend from the ventral margins of all arms to web margin beginning at level of greatest deep of web, typically occurs at the level of suckers 35 to 37, the level of first distal enlarged suckers in males. **In mature males, maximum proximal enlarged sucker diameter exceeds that of distal enlarged suckers. Distal sucker enlargement absent on arms I, slight on arms II, greatest on arms III and IV. The distal enlarged fields comprises 9 to 11 contiguous suckers, beginning at about sucker 34 to 40, with suckers 40 or 41 usually largest.** First cirrus usually occurs between suckers 3 and 4 or 4 and 5. Basal portion of the shell with concave outer surface and convex inner surface.

**Size:** Total weight reaches 5 650 g in males of 350 mm total length (TL) and 2 959 g in females of 285 mm total length.

**Habitat, biology, and fisheries:** Benthic species, inhabiting muddy bottoms, from 788 to 1 450 m. The diet is composed of small epibenthic and suprabenthic crustaceans and polychaetes. No conspicuous feeding rhythm was detected. The higher capture abundances recorded during night time could imply a change in activity independent of feeding. Behaviour displays such as bottom resting, flat-spreading, web-inversion and ballooning response were observed. Mature males and females are collected in all seasons of the year, both in the northern and southern Atlantic. Potential fecundity is 3 200 eggs. Eggs are probably released at 1 or 2 at a time. Mineral composition of egg shell indicates that sulphur (27%) and phosphorus (20%) are the major components. Embryonic development and juvenile life are unknown. Of not interest to fisheries.

**Distribution:** Eastern Atlantic, from off Ireland to Namibia and possibly to South Africa.



## ALLOPOSIDAE

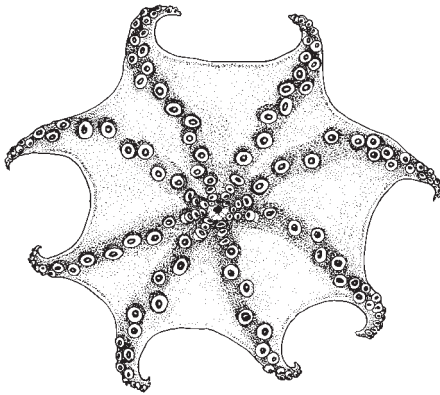
### Gelatinous giant octopods

This monotypic family contains a single species. Consequently, diagnostic characters, habitat, biology and interest to fisheries coincide.

*Haliphron atlanticus* Steenstrup, 1861

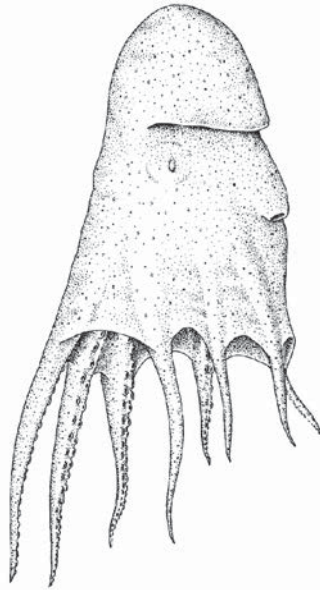
**Frequent synonyms / misidentifications:** *Alloposus mollis* Verrill, 1880 / None.

**FAO names:** En – Gelatinous giant octopod; Fr – Poulpe gelée géant; Sp – Megapulpo gelatinoso.



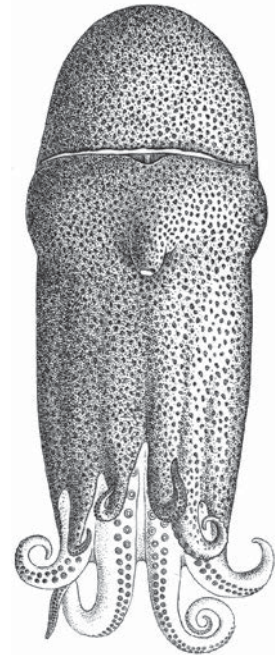
(after Guerra, 1992)

oral view



(from Guerra, 1992)

lateral view



ventral view

**Diagnostic characters:** Body gelatinous and sac-shaped; mantle short; head wide, not narrower than mantle. Mantle aperture very wide. Extensive web between arms. The funnel is embedded in the mantle tissue; it opens in front of the eyes. Complex funnel locking apparatus. Eyes very big, approximately 30% of mantle length. Suckers mostly in 2 series but grade to single series near mouth. No enlarged arm suckers. Third right arm of male hectocotylized. **The hectocotylus is developed in a sac in front of the right eye, it breaks off at mating.** A total of 18 lamellae per demibranch. Hydrostatic organ (swim bladder) present dorsal to digestive system. A remnant of the true shell, a short, thick almost gelatinous stylet, is present. **Purplish violet coloration of the skin.**

#### Similar families occurring in the area

This family was included by Naef (1923) in the superfamily Argonautoidea together with Argonautidae, Ocythoidae and Tremoctopodidae. These 4 families are primarily distinguished from the rest of octopods by an unusual means of copulation which involves transferring a detached hectocotylus from the male to the female. Also, males usually are much smaller than females and dwarf in 3 over 4 families. The gelatinous Alloposidae females do not produce calcareous shells as Argonautidae females do. They can be distinguished from Tremoctopodidae because they do not have a well-developed web between arms I and II. Ocythoidae females have the ventral surface of the mantle covered by tubercles interconnected ridges.

**Size:** Females up to over 400 mm mantle length and up to an estimated 4 m total length (TL) (O'Shea, 2004). Males are much smaller than females (i.e. about 100 mm ML, about 300 mm TL), but larger for argonautoids.

**Habitat, biology, and fisheries:** Meso- to bathypelagic octopod. Occurring from the surface to a few thousand metres depth. Larvae and juveniles inhabit pelagic waters from epipelagic to bathypelagic, mainly above slopes and submarine canyons; adults are frequently found close to the bottom in bathyal depths. Females carry their eggs within the web and near the mouth. Spawning seems to be benthic. The habitat of this octopod is unusual. Brooding females have been captured in bottom trawls and videotaped swimming within centimetres of the ocean floor, suggesting a benthopelagic habitat along the slope. However, it has been taken also from the open ocean, thousands of metres from the ocean floor and hundreds of miles from the nearest slope. Common food item of blue sharks and sperm whales. Not of interest to fisheries.

**Distribution:** A very widely distributed cosmopolitan species, from tropical to high latitudes.



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## AMPHITRETIDAE

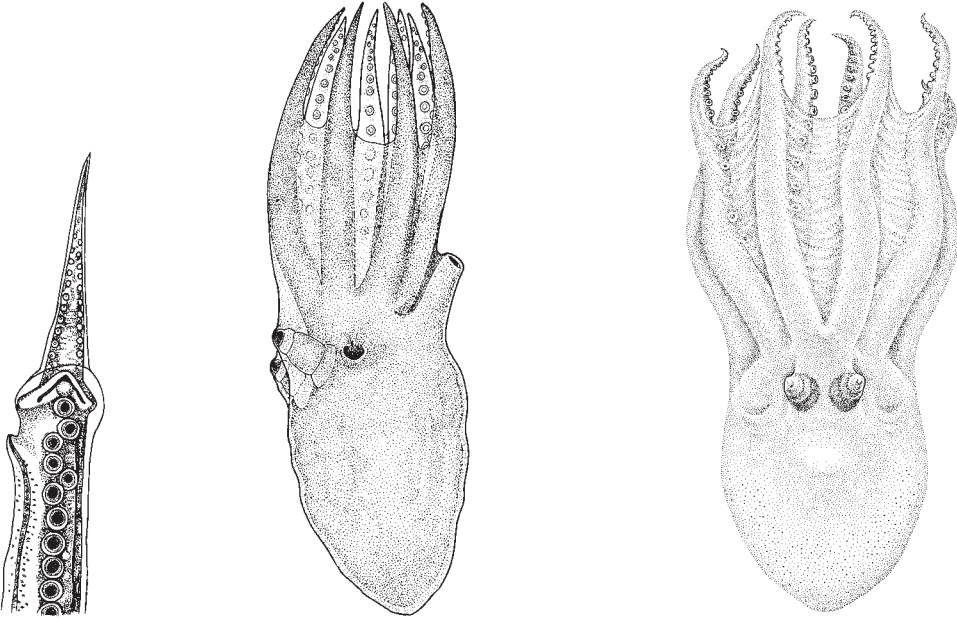
### Telescope octopods

A single species occurring in the area.

*Amphitretus pelagicus* Hoyle, 1885

**Frequent synonyms / misidentifications:** Probably *Idioctopus gracilipes* Taki, 1962 / None.

**FAO names:** **En** – Telescope octopod; **Fr** – Poulpe télescope; **Sp** – Pulpo telescópico.



hectocotylus

lateral view

dorsal view

**Diagnostic characters:** Gelatinous, transparent. Eyes tubular in shape. Funnel fused ventrally to mantle. Mantle opening reduced to broad pores lateral to funnel. Arm suckers in **single series proximally, double series distally**. Right arm III of male hectocotylized. **Ligula with 2 series of papillae; 27 or 28 suckers on the hectocotylized arm**. Stomach lies dorsal to digestive gland. Radula is ctenoglossan.

**Size:** Maximum mantle length 100 mm.

**Habitat, biology, and fisheries:** Very little is known about the habitat and biology of this meso- and bathypelagic species. Found from about 150 to 2 000 m. Members of this species are able to rotate their eyes and digestive gland to keep them in a vertical orientation. Of no interest to fisheries.

**Distribution:** Tropical and subtropical, probably cosmopolitan.

**Remarks:** At the time of going to print, Strugnell *et al.* (2013) used molecular evidence to merge the families Amphitretinae, Bolitaeninae and Vitreledonellinae into a single family, Amphitretidae.



**References**

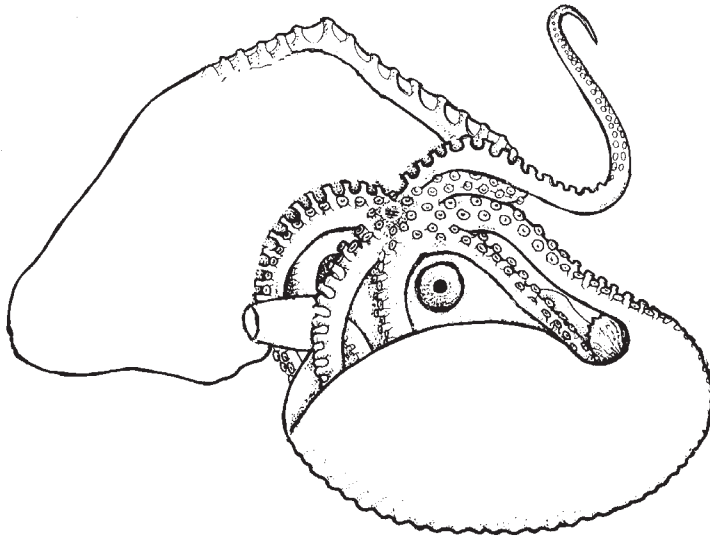
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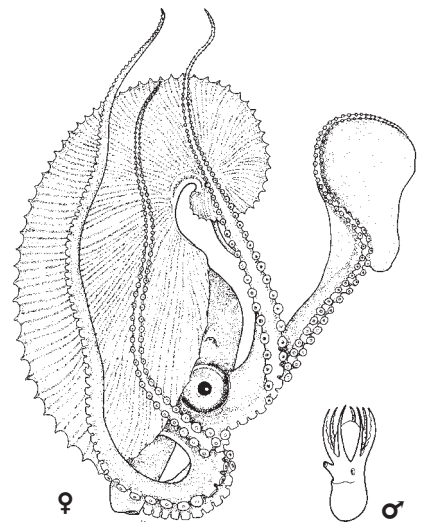
## ARGONAUTIDAE

### Paper nautilus

**Diagnostic characters:** Males maximum total length about 30 mm, 10 to 12 mm mantle length. Calcareous shell of females 250 to 300 mm of diameter; the female reaches up to 450 mm total length and 90 mm mantle length. Muscular, pelagic octopods. **Females secrete a thin calcareous 'shell' in which they reside.** The dorsal arms of females are modified with large, flag-like membranes that expand over the shell and are responsible for the secretion of the shell. Eyes are very large and webs very small. The mantle-funnel locking apparatus consists of knob-like cartilages (mantle) and matching depressions (funnel). **Males are dwarfs.**



**Habitat, biology, and fisheries:** Pelagic octopods. Some species live near the coasts but others are oceanic animals. They live in tropical and subtropical waters worldwide from the surface down to about 500 m. The entire third right arm is hectocotylized in males and carried in a special sac. At mating, the hectocotylus, which carries 1 large spermatophore, breaks out of its sac and then from the male body. The free hectocotylus invades, or is deposited in, the female's mantle cavity, where it remains viable and active for some time. The hectocotylus was first described as a worm parasitic on the female. The calcareous shell secreted by the arms of the female is not a true shell but an incubatory or brood chamber, paper-thin where the female reside. A female with a shell length of 88 mm was estimated to be carrying 48 800 eggs. The eggs are very small (0.6 to 1.2 mm). The female broods the eggs in the shell until larvae are hatched. Spawning is intermittent. Paper nautilus prey upon pelagic crustacean, gastropoda, bivalve and cephalopod larvae. They cling to any object floating on the surface of the sea, mainly jellyfishes. Main predators are tuna, lancefishes, seabirds and marine mammals. Of no interest to fisheries, although some shell trade exists in some countries.



lateral view

Argonautidae

**Similar families occurring in the area**

This family was included by Naef (1912) in the superfamily Argonautoidea together with Alloposidae, Tremoctopodidae and Ocythoidae. These 4 families are primarily distinguished from the rest of octopods by an unusual means of copulation which involves transferring a detached hectocotylus from the male to the female. Also, males usually are much smaller than females and dwarf in 3 over 4 families. In none of the 3 other families females produce calcareous shells. Females do not produce calcareous shells in the other 3 families.

**Key to the species occurring in the area (only for females shell)**

- 1a. Shell large (diameter up to 250 to 300 mm), laterally flattened, with narrow keel (width up to 15% of shell diameter) and numerous ribs, close together, often split into 2 . . . . . → 2
- 1b. Shell small (diameter up to 100 mm), laterally not flattened, keel wide (width 10 to 15% of shell diameter) and ribs not numerous . . . . . ***Argonauta hians***
- 2a. Keel very narrow, its width equals, rarely exceeds 6% of shell diameter; ribs smooth, more than 50 in large shells; each ribs terminating on the keel in an acute tubercle . . . . . ***Argonata argo***
- 2b. Keel wide, its width 10 to 15% of shell diameter; ribs representing chains of separate tubercles or nodules, 30 to 40 ribs on large shells. . . . . ***Argonauta nodosus***

**List of species occurring in the area**

The symbol 🐙 is given when species accounts are included.

- 🐙 *Argonauta argo* Linnaeus, 1758.
- 🐙 *Argonauta hians* Lightfoot, 1786.
- 🐙 *Argonauta nodosus* Lightfoot, 1786.

**Remarks:** At least 4 species of argonauts exist (Nesis, 1987). However, intraspecific variation in females shell shape generated confusion in the species identification. Therefore, a large number of species names exist, currently of unresolved status (Sweeney & Young, 2004). Also, the geographical distribution of some species can be biased due to the fact that the empty shells are frequently transported by winds and currents. A revision is needed.

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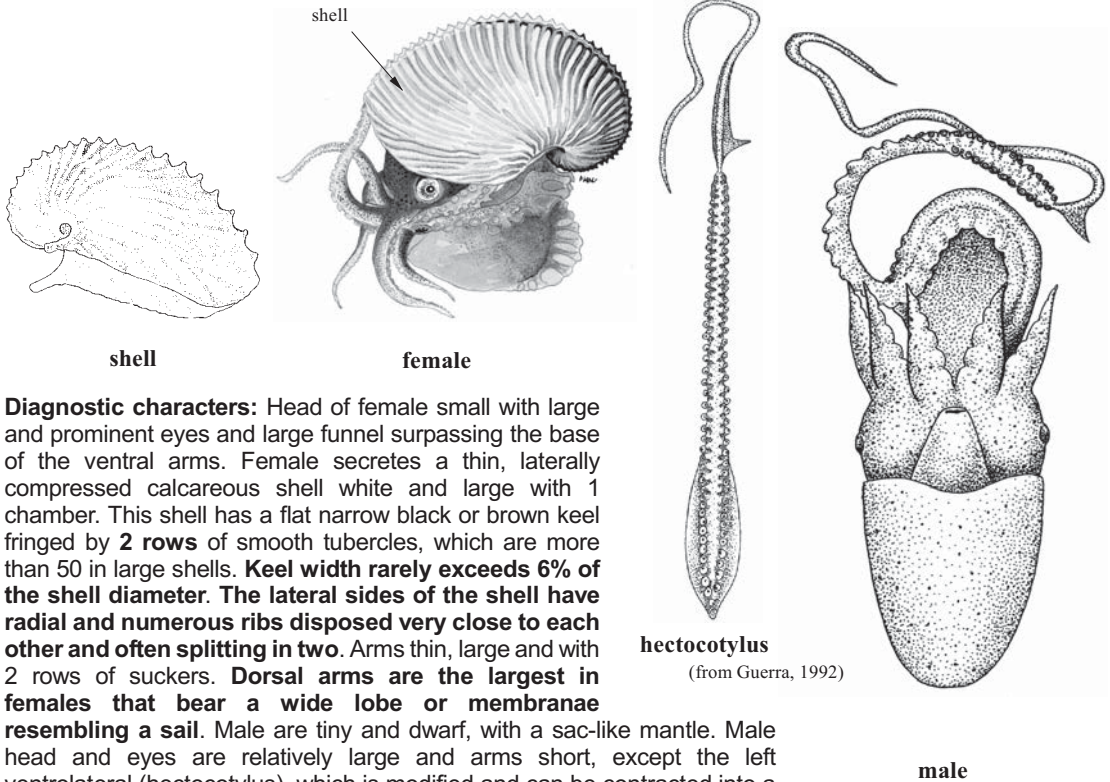
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*Argonauta argo* Linnaeus, 1758

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

**FAO names:** **En** – Greater argonaut; **Fr** – Argonaute papier; **Sp** – Argonauta común.



hectocotylus  
(from Guerra, 1992)

male

**Diagnostic characters:** Head of female small with large and prominent eyes and large funnel surpassing the base of the ventral arms. Female secretes a thin, laterally compressed calcareous shell white and large with 1 chamber. This shell has a flat narrow black or brown keel fringed by **2 rows** of smooth tubercles, which are more than 50 in large shells. **Keel width rarely exceeds 6% of the shell diameter. The lateral sides of the shell have radial and numerous ribs disposed very close to each other and often splitting in two.** Arms thin, large and with 2 rows of suckers. **Dorsal arms are the largest in females that bear a wide lobe or membranæ resembling a sail.** Male are tiny and dwarf, with a sac-like mantle. Male head and eyes are relatively large and arms short, except the left ventrolateral (hectocotylus), which is modified and can be contracted into a sac. Hectocotylus with a **long slender “penis”** and about 65 suckers in 2 rows.

**Size:** Maximum mantle length 120 mm in females (shell diameter up to over 250 mm) and 10 mm in males.

**Habitat, biology, and fisheries:** Epipelagic octopod, inhabits mainly coastal waters (from the surface to about 500 m). Females mature at about 25 mm mantle length, whereas males at about 8 mm. Eggs are very small (0.6 to 0.8 mm) and females brood them in the shell until the hatching. This species tends to adhere to solid substrates. Spawning seems to take place in summer and winter. Occasionally, massive occurrences are reported near shore as a result of currents shifting. Greater argonauts are preyed upon by pelagic fishes, seabirds and marine mammals. Occasionally found in markets of India and Japan, as a result, probably, of fortuitous catches. Of no interest to fisheries in the eastern Atlantic.

**Distribution:** Worldwide in temperate and tropical subtropical seas. In the western Atlantic, its distribution extends from Cape Cod to waters off Venezuela, whereas in the eastern Atlantic, this species is distributed from the Portuguese coast to South Africa. *Argonauta argo* has been recorded in the Azores and Madeira Archipelagos. The northern boundary of this species is situated in Galician waters (northwestern Spain).



***Argonauta hians* Lightfoot, 1786**

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

**FAO names:** **En** – Lesser argonaut; **Fr** – Argonaute mineur; **Sp** – Argonauta menor.

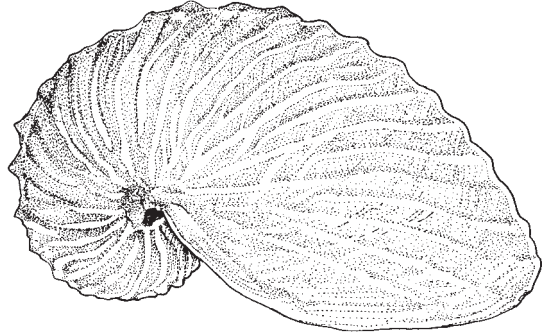
**Diagnostic characters:** Shell small (diameter up to 100 mm), laterally not flattened. Keel wide (10 to 15% of shell diameter). Ribs not numerous. Shell surface usually smooth. Centre of spiral not compressed, "horn" in centre of the shell either present or absent. Tubercles on keel brown, ususally 15 to 20.

**Size:** Shell diameter to over 100 mm. Maximum mantle length 40 mm in females.

**Habitat, biology, and fisheries:**

Epi-mesopelagic oceanic octopods. The larvae are broadly distributed in the water column to about 500 m, predominantly in upper 100 m. Late juveniles and adults at the surface. Males mature at about 6 mm mantle length and females at approximately 18 to 20 mm mantle length. The period of maturation is very extended. Egg size ranges from 0.8 to 1.1 mm in length. Of no interest to fisheries.

**Distribution:** Tropical cosmopolitan species. South equatorial counter-current, off Cape Palmas in Liberian waters and Gulf of Guinea at 10°N 7°W.



shell



***Argonauta nodosus* Lightfoot, 1786**

**Frequent synonymys / misidentifications:** *Argonauta tuberculata* Shaw, 1791; *A. gracilis* Kirk, 1885; *A. boettgeri* (not Maltzan): Massy, 1916 / None.

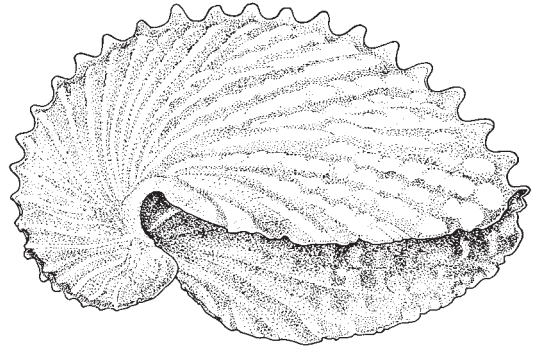
**FAO names:** **En** – Knobbed argonautid; **Fr** – Argonaute noueux; **Sp** – Argonauta nodoso.

**Diagnostic characters:** Shell large, laterally flattened; keel width 10 to 15% of shell diameter. Ribs tuberculated; 30 to 40 ribs on large shells. Outer demibranch gill lamellae 14 to 17.

**Size:** Males are tiny, dwarf (10 to 12 mm ML). Females to over 130 mm mantle length. Calcareous shell secreted by the females 250 to over 300 mm of diameter.

**Habitat, biology, and fisheries:** Epipelagic octopod, mainly inhabiting coastal waters. Found from surface to 485 m on bottom depth of 4 850 m. Eggs are very small (1.3 x 0.5 mm). Females brood the eggs in the shell until the hatching. Hectocotylus of males autonomous (self-amputating) into the egg mass. This species tends to adhere to solid substrates. *Argonauta nodosus* is preyed upon by pelagic fishes, seabirds and marine mammals. Spawning seems to take place, at least in summer and winter. Occasionally mass occurrences are reported near shore as a result of changed currents. No directed fisheries do exist.

**Distribution:** Cosmopolitan. In the southeastern Atlantic off Namibian and South African waters. Tropical Indo-Pacific from Red Sea and southeastern Africa to southern Japan. Eastward to Polynesia and perhaps to Chilean waters. Most common in Australia – New Zealand region.



shell

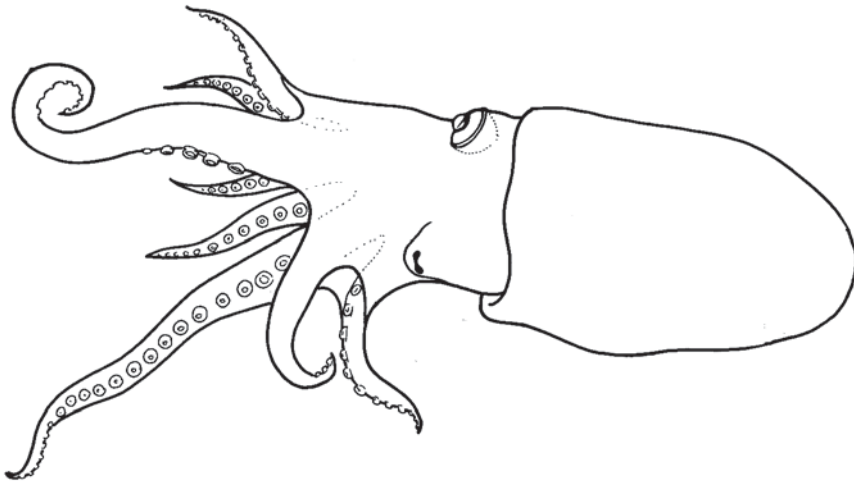


## Incirrate OCTOPODS

### BOLITAENIDAE

#### Pelagic octopods

**Diagnostic characters:** Gelatinous semitransparent octopods. Mantle aperture wide. Arms short, with length less than mantle length. Suckers in a single row. Eyes laterally compressed. Long axis of digestive gland (which can be seen by transparency in live) in parallel to body axis. Stomach posterior to digestive gland. Radula with multicuspoid teeth (ctenoglossa). Third right arm in *Bolitaena* hectocotylized (*Japetella* apparently lacks hectocotylization although some sexual dimorphism of arms III occurs). Mature females with a circular light organ surrounding the mouth. Numerous chromatophores are present all over the mantle.




**Habitat, biology, and fisheries:** Common meso- to bathypelagic octopods, occurring from 100 to 2 500 m. Secretions from the posterior salivary gland of males could act as a pheromone to attract females. The oral light organ in females seems to serve as a signal to attract males for mating. Of no interest to fisheries.

**Remarks:** The family comprises 2 genera, *Japetella* and *Bolitaena*, both probably represented by 1 single species (monotypic). Immature specimens of the 2 genera can be difficult to distinguish. The most obvious features are the size of the eyes (larger in *Japetella*) and the distance between the eyes (larger in *Bolitaena*). When comparing adjacent octopods, these differences are distinct. However, with isolated specimens, the differences are not always obvious. For this reason, a key to the species is not presented here.


#### Similar families occurring in the area

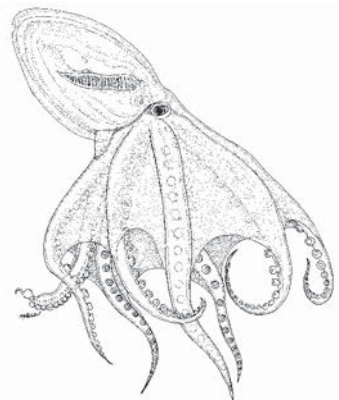
Vitreledonellidae: a glassy gelatinous uncoloured and transparent body, and the optic lobes at a distance from the brain, which leads to very long optic nerves.

#### List of species occurring in the area

The symbol  is given when species accounts are included.

 *Bolitaena pygmaea* (Verrill, 1884).

 *Japetella diaphana* Hoyle, 1885.



Vitreledonellidae

**Remarks:** At the time of going to print, Strugnell *et al.* (2013) used molecular evidence to merge the families Amphitretinae, Bolitaeninae and Vitreledonellinae into a single family, Amphitretidae.

## References

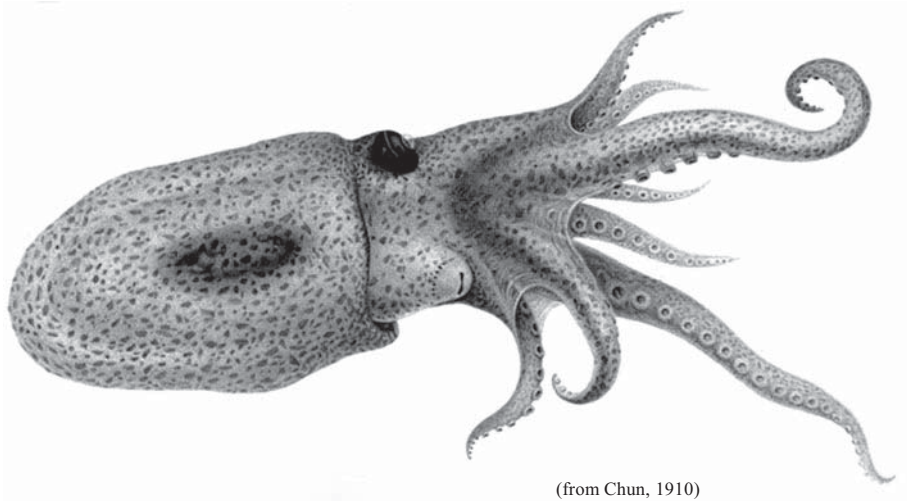
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***Bolitaena pygmaea*** (Verrill, 1884)

**Frequent synonyms / misidentifications:** *Bolitaena microcotyla* Steenstrup in Hoyle, 1886: 16 / None.

**FAO names:** **En** – Pygmy pelagic octopod; **Fr** – Poulpe pélagique pygmée; **Sp** – Pelagopulpo pigmeo.



(from Chun, 1910)

**Diagnostic characters:** Eyes small, 9.12% of mantle length in juveniles. **Arms III are longer than the others.** In males, left arm III hectocotylized, with an elongate ligula; third right arm sexually dimorphic with 1 to 3 greatly enlarged suckers. **Maximum depth of the web 50 to 67% of longest arm length.** Suckers in 1 row set wide apart within web and close to each other outside the web, in distal part of arms. **A luminous organ in the form of a thick ring around the mouth is present in adult, mature females.** Ink sac present, but small. Optic nerves long, optic ganglia remote from brain. **Body coloration light purple, web inside dark purple.**

**Size:** Up to 60 mm mantle length.

**Habitat, biology, and fisheries:** Rare tropical-subtropical cosmopolitan meso-bathypelagic species. Hatchlings are found at about 200 m depth, adults at about 1 400 m. Eggs large, are carried by the female on arms until hatching. Females do not feed during incubation. Species of no interest to fisheries.

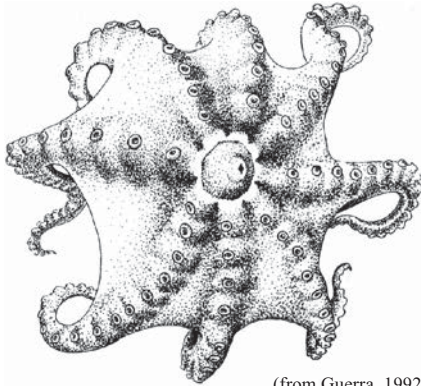
**Distribution:** Tropical-subtropical cosmopolitan species.



***Japetella diaphana* Hoyle, 1885**

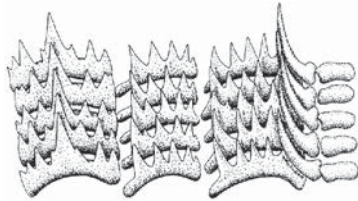
**Frequent Synonyms / misidentifications:** *Dorsopsis taningi* Thore, 1949 / None.

**FAO names:** **En** – Diaphanous pelagic octopod; **Fr** – Poulpe pélagique translucide; **Sp** – Pelagopulpo translúcido.



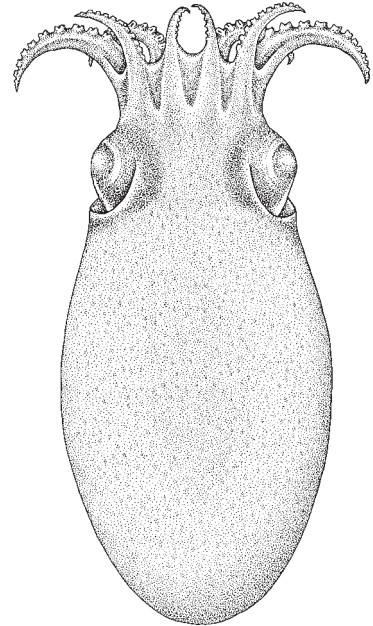
(from Guerra, 1992)

**oral view**



(from Guerra, 1992)

**radula**



(illustration: K. Hollis/ABRS)

**dorsal view**

**Diagnostic characters:** **Eyes relatively large**, diameter exceeds 18% of the mantle length. Optic nerves short, optic ganglia in close proximity to brain. Suckers large, diameter on the average 6% of mantle length, distance between neighbouring suckers shorter than suckers diameter. **Maximum depth of umbrella 25 to 35% of longest arm length. No hectocotylus, only some enlarged suckers in middle part of right third arm in male. Adult, mature, female with a light organ surrounding the mouth; this ring-shaped organ is bright yellow in live animals and pale pink in fixed animals.** Brown chromatophores located along the whole mantle and arms.

**Size:** Up to 85 mm mantle length.

**Habitat, biology, and fisheries:** A common bathypelagic species; juveniles also found in epipelagic and mesopelagic waters between 100 and 300 m depth while adults are mainly concentrated between 1 750 and 2 500 m depth. Eggs small and connected by stalks. This species live within the minimum oxygen layer off Hawaii. Frequently found in the stomach contents of tunas and swordfishes. Of no interest to fisheries.

**Distribution:** Cosmopolitan in tropical and subtropical waters.



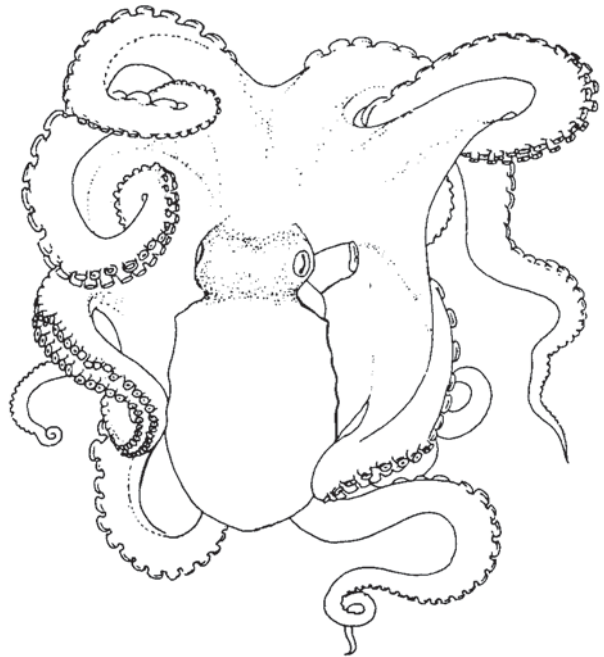
## OCTOPODIDAE

### Benthic octopods

**Diagnostic characters:** Body short, muscular, sac-like, without lateral fins. Eight arms around the mouth, no tentacles. Suckers in 1 or 2 rows, and **no cirri on arms**; suckers lack chitinous rings and are set on the arms without stalks. **Mantle-funnel locking apparatus absent. Water pores on head absent.** One of the third arms modified in males (hectocotylus), as an open sperm groove (running along ventral edge of the arm) and a modified **terminal tip** (ligula), typically **spoon-like. Hectocotylus not detachable.** Internal shell reduced to a pair of stylets or lost. Stomach and caecum posterior to digestive gland. Lateral radula teeth (if present) simple, with single cusp.

**Size:** Benthic octopods range in size from pygmy species, mature at less than 1 gr total weight, to the giant Pacific octopus of the North Pacific reaching weights in excess of 150 kg, with an arm span of over 5 m.

**Habitat, biology, and fisheries:** Members of this family are the best known of the octopods. They are mostly benthic animals living in all oceans of the world from the equator to polar latitudes. There is considerable diversity within this family. Benthic octopods occupy a wide range of habitats from coral and rocky reefs, seagrass and algal beds, to sand and mud soft substrates, from intertidal zones to the deep sea (to at least 5 000 m). Mating occurs by males transferring sperm packages (spermatophores) to the females using the hectocotylus. Some species lay relatively large eggs, other small eggs, but all are brooded by the female during a prolonged period of incubation. Eggs are typically laid in strings or festoons, where the egg stalks are interwoven or glued together. Most species attach the eggs to the substrate, shells or man-made objects. Females of several species carry the egg strings on their arms, enveloping them within the webs. In most species females brood tending the eggs until hatching and during this period almost cease feeding; hence, females mortality is high soon after the hatching of the eggs. Hatching behaviour and mode of life depends on egg size. Species with small eggs (up to 2 mm long) produce many tiny planktonic offsprings (paralarvae) which spend some time transported in the water column prior of changing to benthic life of adults. The duration of this planktonic life is inversely related to water temperature. Species with large eggs (up to 30 mm long) produce few, large, benthic, "crawl-away" hatchlings. Members of this family prey on a wide range of animals: crabs, gastropods and bivalve molluscs, fish, polychaete worms and other octopods. As most cephalopods, octopuses are fast growing. The life span of members of this family ranges from about 6 months in small tropical species to several years (up to 5) in cold-water species. Many shallow-water octopods exhibit a remarkable primary defence or crypsis, which can be regarded as a mosaic varying in size, brightness, colour, shape and texture. Camouflage is the type of crypsis more used by benthic octopods. In this form of crypsis the animal takes on the appearance of the substrate or background. Camouflage is mainly produced by colour changes due to chromatophore combinations and passive reflexion of specialized cells (iridophores and leucophores). However, textural and postural components are also equally important for crypsis. Textural changes are produced by both integumental trellis components in the skin and musculature. Many Octopodidae have a great repertoire of sculptures formed by raised (even branched) muscular patches and papillae, and the skin structures provide different types of textures. This protective defence is completed by a wide range of species-specific body patterns. Some sand-dwelling octopuses can escape threatening situations by burying into the sand and emerging away from the burying spot. Other benthic octopods use extraneous material to improve camouflage. Thus, some species hold pebbles or sponge-covered and small rocks with suckers.



dorsal view

Another defence mechanisms in this family are ink dummy decors, ink smoke screens, arm-dropping and production of strong neurotoxins advertised by distinctive colour patterns. Among the secondary defences, some species are able to display alarm chromatic signals such as spots and a pair of false-eye (ocelli). These ocellate octopods extends web and show their ocelli producing the sensation of being the head of a large predator. Many benthic octopods are predominantly active during the day, but other species are active only at night. True territoriality has not been observed in benthic octopods.

Benthic octopods are one of the most traditional cephalopod resources, and many species have high fisheries profiles in different areas of the world. Some of these fisheries are industrial, but others are artisanal, small-scale fisheries. They are collected by several different kinds of gear from hooked poles or spears to the commercial trawl nets, multiple baited lines, traps or clay pots. The majority of the species are harvested for human consumption, although some species are collected primarily as bait for finfish fisheries. They are marketed fresh, frozen, or dried. According with the 2012 FAO Yearbook of Fisheries Statistics, the total harvested in 2010 for all Octopodidae species in the world were around 337 000 tonnes. The most important octopod fishery was located in the FAO Fishing Areas 61 (northwestern Pacific) and 71 ( western central Pacific), where around 63% of the total Octopodidae were caught mainly by Japan, China, Korea, Russia, Taiwan (Province of China), Thailand and Philippines. Total landings from the northeastern Atlantic (Area 27) were around 19 000 tonnes being Portugal and Spain the most important fishing countries. Landings were around 18 300 tonnes in the Mediterranean Sea. The most important fishing ground to the common octopus (*Octopus vulgaris*) is located in Area 34 (eastern central Atlantic), where around 56 000 tonnes (16% of total Octopodidae landings) were recorded. The remaining Octopodidae landings are distributed among the rest of FAO fishing areas. There are, however, some potential resources in sub-Antarctic waters, yet to be determined.

#### Similar families occurring in the area

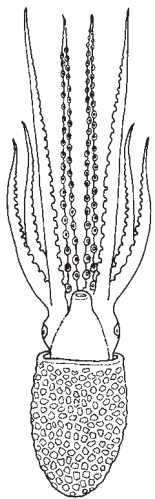
Ocythoidae, Tremoctopodidae and Argonautidae, all are families of pelagic octopods with muscular bodies, however, a funnel-locking apparatus is present in members of those families, males are dwarfs and detachable hectocotyli develop in sacs.

In addition, Tremoctopodidae have water pores on both dorsal and ventral sides of the head and females have an extensive membrane or web connecting the dorsal and the dorsolateral arms.

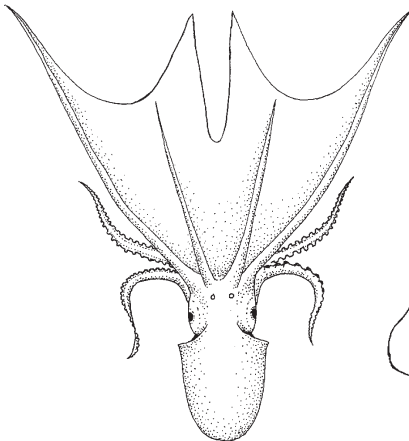
Argonautidae females have flaps on the dorsal arms which secrete and hold a shell-like egg case (shell).

Ocythoidae have water pores on the ventral side of the head, and females have permanent reticulate sculpturing on the ventral side of the mantle.

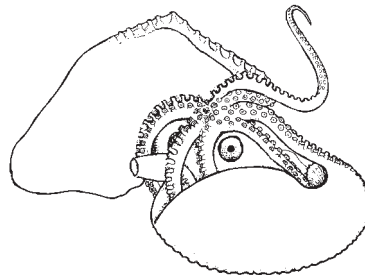
Alloposidae have a gelatinous consistency.



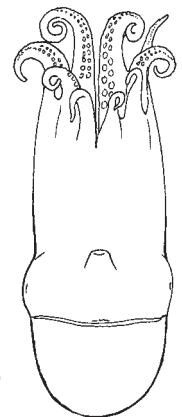
Ocythoidae



Tremoctopodidae



Argonautidae



Alloposidae

**Remarks:** Four subfamilies have been recognized on the basis of relatively few characters, the Octopodinae, the Eledoninae, the Bathypolypodinae and the Graneledoninae. The validity of these groupings has not been firmly established and as this Guide goes to printer, a paper is published on-line, which alters octopuses systematic (Strugnell *et al.*, 2013). Results of this study give evidence that the family Octopodidae is paraphyletic and contains the gelatinous pelagic families. The following taxa are assigned family taxonomic rank: Amphitretidae, Bathypolypodidae, Eledonidae, Enteroctopodidae, Megaleledonidae and Octopodidae *sensu nov.* They are placed in the superfamily Octopodoidea. In this guide we follow the taxonomic assignments given by Norman and Hochberg, 2005.

### Key to the subfamilies occurring in the area

- 1a. Ink sac present (sometimes embedded in the digestive gland, but always functional) . . . . . → 2
- 1b. Ink sac absent . . . . . → 3
- 2a. Arm with 2 row of suckers . . . . . **Octopodinae**
- 2b. Arm with a single row of suckers . . . . . **Eledoninae**
- 3a. Arm with 1 row of suckers . . . . . **Graneledoninae**
- 3b. Arm with 2 rows of suckers . . . . . **Bathypolypodinae**

### Key to species of the subfamily Octopodinae occurring in the area

- 1a. With permanent and erected papilla (ae) over each eye . . . . . → 2
- 1b. No permanent and erected papilla (ae) over each eye . . . . . → 3
- 2a. Paired narrow erected and very conspicuous papillae over each eye; skin ridge absent from lateral mantle . . . . . ***Pteroctopus tetracirrhus***
- 2b. Single large erected and very conspicuous and papilla over each eye; lateral mantle skin ridge present . . . . . ***Scaevurgus unicolor***
- 3a. Mantle, head and arms densely covered by small distinct rounded wart-papillae set closed together . . . . . ***Amphioctopus burryi***
- 3b. Mantle, head and arms smooth or with separate scattered wart-papillae (mainly between eyes) . . . . . → 4
- 4a. All arms of subequal length. . . . . ***Octopus vulgaris***
- 4b. Some arms longer than others . . . . . → 5
- 5a. Dorsal arms (I) clearly longer and thicker than lateral and ventral arms; arms not conspicuously asymmetrical neither slender; many white spots on dorsal side of the mantle and arms over a red wine background colour . . . . . ***Callistoctopus macropus***
- 5b. Ventrolateral (III) arms longer than others; arms often conspicuously asymmetrical (1 arm may be much longer than the opposite arm of the same pair) and slender; without spots on dorsal side of the mantle and arms . . . . . ***Macrotritopus defilippi***

### Key to the genera and species of Eledoninae in the area

- 1a. Hectocotylied arm tip of mature male fleshy and convoluted in the form of a walnut, no obvious calamus, distal suckers of normal arms of mature males modified into a fringe of long thin papillae . . . . . ***Aphrodoctopus schultzei***
- 1b. Hectocotylied arm tip as normal ligula and calamus or may lack calamus; distal suckers of normal arms of mature males modified as regular ridges or as spongiform tissue . . . . . → 2
- 2a. Whole body densely beset by minute papillae with large ones scattered between them; low peripheral skin fold or ridge along the side of the body . . . . . ***Eledone cirrhosa***
- 2b. Body smooth or with scarce small papillae on dorsal side; no peripheral skin fold . . . . . → 2

- 3a. Arms of subequal length . . . . . ***Eledone moschata***  
 3b. First arms (I) longer by 33 to 50% than the II, which are considerably longer than III and IV . . . . . ***Eledone caparti***


#### Key to the genera and species of *Bathypolypodinae* occurring in the area
















- 1a. Skin of the body covered by wart-papillae; ligula of mature males large (15 to 49 % of hectocotylized arm) and spoon-shaped, deeply excavated with a number of well-defined transverse ridges (laminae) . . . . . ***Bathypolypus***  
 1b. Skin smooth; ligula of moderate size (5 to 7% of hectocotylized arm), elongate, typically with a closed ligula groove; laminae absent . . . . . ***Benthoctopus***

#### Key to the *Bathypolypus* species occurring in the area

- 1a. Supraocular papillae present, sharp, conical . . . . . ***Bathypolypus valdiviae***  
 1b. Supraocular papillae absent or slightly visible . . . . . → 2  
 2a. Hectocotylus with 70 to 85 suckers; other arms usually with over 200 suckers . . . . . ***Bathypolypus ergasticus***  
 2b. Hectocotylus with 50 to 65 suckers; other arms with 140 to 200 suckers . . . . . ***Bathypolypus sponsalis***

#### List of species occurring in the area

The symbol  is given when species accounts are included.

-  *Amphioctopus burryi* (Voss, 1950).  
 *Aphrodoctopus schultzei* (Hoyle, 1910).\*  
 *Bathypolypus ergasticus* (P. Fischer and H. Fischer, 1892).  
 *Bathypolypus sponsalis* (P. Fischer and H. Fischer, 1892).  
 *Bathypolypus valdiviae* Thiele in Chun 1915.  
 *Benthoctopus januarii* (Hoyle, 1885).  
 *Callistoctopus macropus* (Risso, 1826).  
 *Eledone caparti* Adam, 1950.  
 *Eledone cirrhosa* (Lamarck, 1798).  
 *Eledone moschata* (Lamarck, 1798).  
 *Graneledone verrucosa* (Verrill, 1881).  
 *Macrotritopus defilippi* (Vérany, 1851).  
 *Octopus vulgaris* Cuvier, 1797.  
 *Pteroctopus tetracirrhus* (Delle Chiaje, 1830).  
 *Scaergus unicirrhus* (Delle Chiaje, 1841).

\***Remarks:** *Octopus schultzei* (Hoyle, 1910) was placed in the new genus *Aphrodoctopus* by Roper and Mangold (1992), on the base of “unusual characters not referred to in the original description”. These authors describe the most striking finger-like processes on all arm tips, except the hectocotylus, the very small terminal portion of the hectocotylized arm without a calamus and other distinguishing features, the systematic significance of which, according to them, supported the establishment of a new genus. The species was referred to as *A. schultzei* in several scientific papers subsequently (e.g., Voight, 1993; Norman, 2000), but it is placed back to *Eledone* by Norman and Hochberg (2005) and Norman *et al.* (2014) comment that the 2 rows of suckers on the arms is an artifact due to contraction in preserved specimens, also observed in other *Eledone* species. However, the genus *Aphrodoctopus* is retained in the recent most review by Strugnelli *et al.* (2013) and it is retained here as a cautionary approach, waiting for further studies and clarifications.

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***Amphioctopus burryi* (Voss, 1950)**

**Frequent synonyms / misidentifications:** *Octopus burryi* Voss, 1950; *O. vincenti* Pickford, 1955 / None.

**FAO names:** En – Brownstriped octopus; Fr – Poulpe à rayures bleues; Sp – Pulpo granuloso.

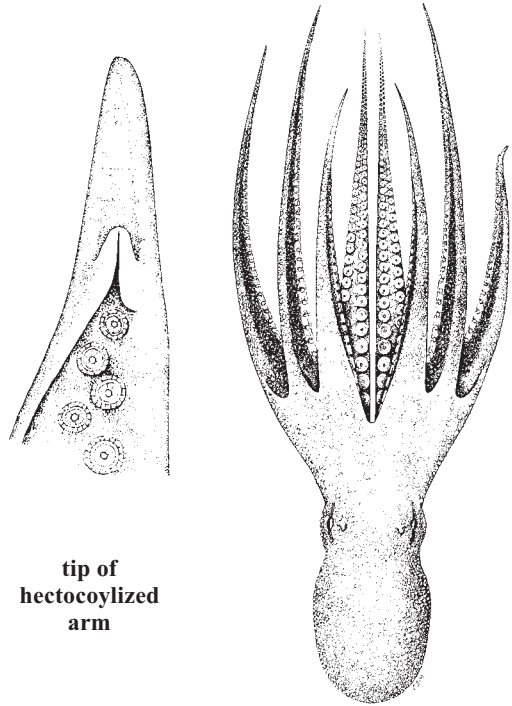
**Diagnostic characters:** Mantle, arms and head densely covered with closely set round papillae.

Gill lamellae 8 to 11 per outer demibranch. Right arm III in male hectocotyized. Ligula length 4 to 6% of hectocotyized arm length with weak laminae. Calamus with **deep groove**. Presence of a **dark-blue to purplish brown band along dorsolateral surface of each arm**. Web inside with white reticulated stripes on red background.

**Size:** Up to 70 mm mantle length.

**Habitat, biology, and fisheries:** A benthic species taken on sandy bottoms, often covered by, broken coral and shells, from 0 to 200 m on the lower part of the continental shelf. Members of this species perform fast, efficient burying manoeuvres to hide and are ambush predator. The life cycle is estimated to range from 8 to 10 months at water temperatures ranging from 22° to 25°C. Females produce about 35 000 eggs. Egg length ranges from 2 to 2.5 mm. Females carry their eggs during the embryonic development. Currently taken only as bycatch in trawls. Of minor interest to fisheries.

**Distribution:** Tropical eastern and western Atlantic: from Georgia to the Gulf of Mexico, Caribbean Sea and northern Brazil, and off western Africa, from the Canary Islands, Senegal and Cape Verde Islands to Angola and St Helena.



tip of  
hectocotyized  
arm

dorsal view



***Aphrodoctopus schultzei* (Hoyle, 1910)**

**Frequent synonyms / misidentifications:** *Octopus shultzei* (Hoyle, 1910) / None.

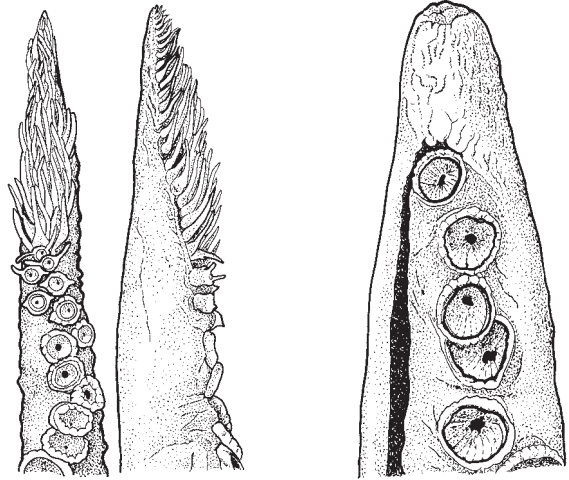
**FAO names:** **En** – Brush-tip octopod; **Fr** – Poulpe de Aphrodite; **Sp** – Pulpo de Afrodita.

**Diagnostic characters:** Suckers on all non-hectocotylized arm tip of males modified into 4 transverse rows of flexible, tapered, finger-like processes. Funnel organ inverted W-shaped with very short, rounded lateral lobes. Suckers on all arms in 2 rows. Several pairs of enlarged suckers on arm pairs I, II and III of males. Hectocotylus simple: **distal tip of the hectocotylus uniform, spongy, with irregular pit near the distal tip; without longitudinal groove, cross-striations, ridges and grooves; calamus absent.** Exposed terminal organ or penis very long, without a diverticulum.

**Size:** Up to 50 mm mantle length; 238 mm total length.

**Habitat, biology, and fisheries:** Benthic octopods. Found on rocky bottoms in shallow waters, from about 20 to 150 m. Of no interest to fisheries.

**Distribution:** Bay of Lüderitz (Namibia) to South Africa.



**tip of arm**

**hectocotylized arm**

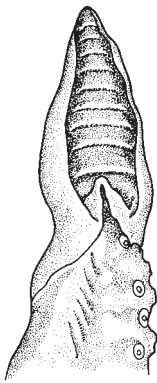
(all illustrations after Roper & Mangold, 1991)



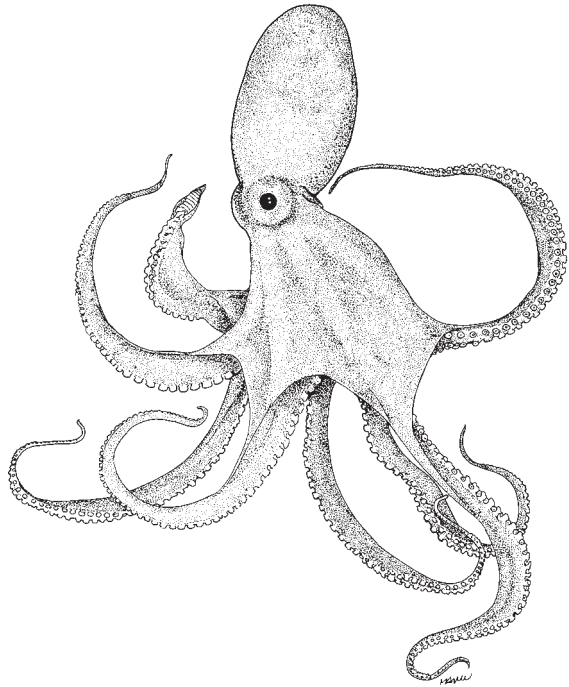
***Bathypolypus ergasticus*** (P. Fischer and H. Fischer, 1892)

**Frequent synonyms / misidentifications:** *Benthoctopus ergasticus* (Fischer and Fischer, 1892); *B. lothei* (Chun, 1913) / None.

**FAO names:** **En** – Fischers' bathyal octopus; **Fr** – Bathypoulpe des Fischers; **Sp** – Batipulpo de los Fischers.



hectocotylus



**Diagnostic characters:** Mantle sac-like, as long as wide, smooth. Head narrower than mantle; neck constriction deep, **no supraocular papillae**. Arms subequals, from 77% to 87% of mantle length. Arm suckers in 2 rows. Web depth about 25% of the longest arm length. Ink sac absent. **Funnel organ consists of almost square-shaped pads**. No greatly enlarged suckers. Suckers diameter in both males and females about 6% of mantle length. Third right arm hectocotylized; **hectocotylus with 70 to 85 suckers; other arms usually with over 200 suckers**; ligula medium-sized (7% of hectocotylized arm length), with **7 strong transverse ridges**. Seven or 8 lamellae on outer demibranch. Spermatophores very large, longer than mantle length. Dark red in colour.

**Size:** Maximum mantle length about 100 mm.

**Habitat, biology, and fisheries:** A deep-living, benthic species, found at depths between 450 and 1 500 m. Habitat and biology are poorly known. It is caught as bycatch in trawl fishing gears. Of no interest to fisheries.

**Distribution:** Northeastern Atlantic from southwestern Ireland to Senegalese waters.



***Bathypolypus sponsalis*** (P. Fischer and H. Fischer, 1892)

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

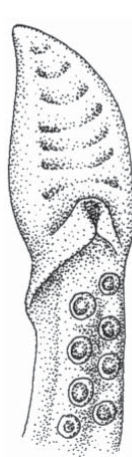
**FAO names:** **En** – Common bathyal octopus; **Fr** – Bathypoulpe commun; **Sp** – Batipulpo común.

**Diagnostic characters:** Mantle globe-shaped, with **smooth skin**. Large eyes (40 to 60% ML). Supraocular papillae slightly visible. Arms short (about 77% TL) with biserial small suckers. Third right arm hectocotylized in males, **shorter (about 68%)** than the opposite; ligula length from 10 to 11% of the hectocotylized arm length; calamus about 50% of the ligula, provided with **6 or 7 copulatory laminae. Hectocotylus with 50 to 65 suckers; other arms with 140 to 200 suckers.** Web extending on 17 to 33% of the arms length. **Funnel organ VV-shaped.** Spermatophores very large, but shorter than mantle length. Seven filaments per demibranch.

**Size:** Up to 100 mm mantle length, usually no more than 70 mm mantle length.

**Habitat, biology, and fisheries:** This is a bathybenthic species occurring on muddy bottoms at depths from 200 to 2 300 m, but it is most common in the depth range between 400 and 700 m. Males mature at smaller sizes between 27 and 45 mm mantle length than females (60 mm ML). In the western Mediterranean, mature individuals are found all year round, with peaks in winter and spring for males and in spring and summer for females. Eggs are large (from 13 to 15 mm long). Mature female brood an average of 100 eggs (from 72 to 135). Monthly growth rate ranges from 7 to 9 mm mantle length in the western Mediterranean (at a medium water temperature of 12°C). Females grow faster than males. Life span is about 14 to 15 months in males and 16 to 18 months in females. These octopods are opportunistic predators, feeding on a great variety of preys: crustaceans, ophiurids, other molluscs (including cephalopods) and bony fish. Females are more active predators than males. Juveniles perform an up-slope ontogenetic migration to depths shallower than 1 400 to 1 200 m. Caught as bycatch in trawl fisheries, but always discarded by fishermen.

**Distribution:** Mediterranean Sea: western basin and northern Aegean Sea; eastern Atlantic, from the Bay of Biscay to Cape Verde.



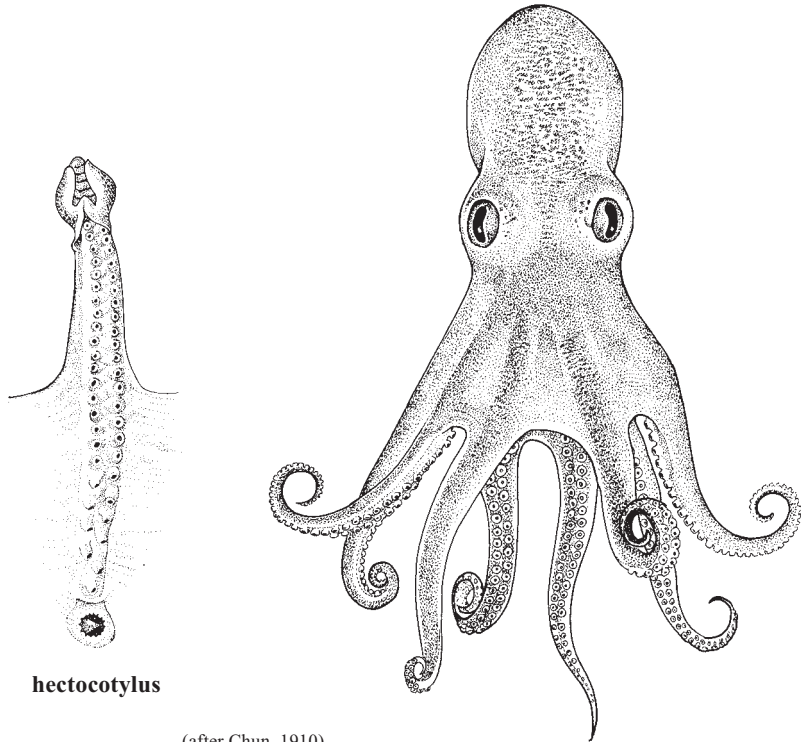
**hectocotylus**  
(from Guerra, 1992)



***Bathypolypus valdiviae*** (Thiele, in Chun, 1915)

**Frequent synonyms / misidentifications:** *Bathypolypus grimpei* Robson, 1924 / *Bathypolypus sponsalis* (Fischer and Fischer, 1892).

**FAO names:** **En** – Valdivia bathyal octopus; **Fr** – Bathypoulpe de Valdivia; **Sp** – Batipulpo de Valdivia.



hectocotylus

(after Chun, 1910)

**Diagnostic characters:** Head surface with a few tubercles or warts; supraocular papillae sharp and conical; web depth 33 to 40% of the longest arm length; arms short; **hectocotylus globose**, almost spherical with **distinct lateral lobes** in adults; ligula with 4 or 5 transverse ridges. Spermatophores very large.

**Size:** Mantle length 80 mm.

**Habitat, biology, and fisheries:** These bathyal octopods are found at depths ranging from about 300 to 1 500 m, but very little is known about their biology. Of no interest to fisheries.

**Distribution:** From Namibia, to Agulhas Bank and adjacent areas in South Africa.



***Benthoctopus januarii* (Hoyle, 1885)**

**Frequent synonyms / misidentifications:** None / *Macrotritopus defilippi* (Vérany, 1851).

**FAO names:** En – Long-arm bathyal octopus; Fr – Bathypoulpe bras-longues; Sp – Batipulpo patilargo.

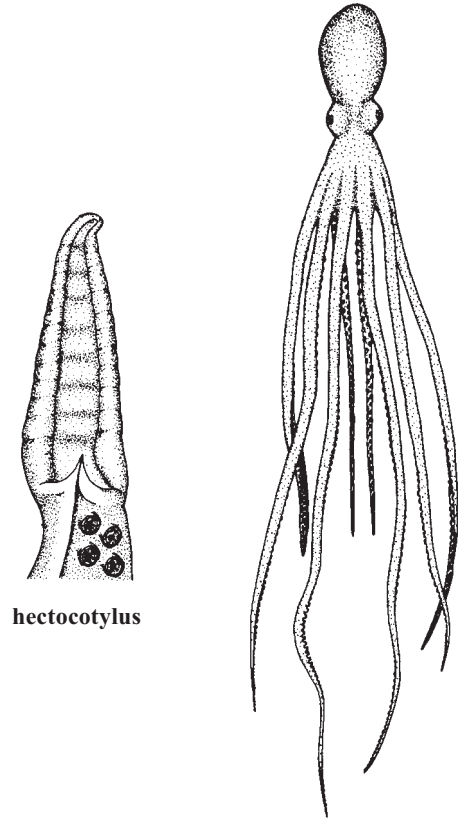
**Diagnostic characters:** Mantle saccular and elongated, smooth and devoid of sculpture. Funnel organ VV-shaped. Arms long, 3 to 4 times longer than the mantle; and attenuated towards the tips, becoming filiform. hectocotylyzed third right arm almost twice shorter than the opposite, ligula length from about 6 to 9% of the hectocotylyzed arm length, pointed and with a deep central groove. Calamus small (from 15 to 25% of the hectocotylyzed arm), but well defined. Gill with 7 or 8 lamellae on each demibranch. In preservation, the dorsal surface is pinkish grey to grey in colour; the ventral surface is slightly paler.

**Size:** Maximum known mantle length 63 mm (female).

**Habitat, biology, and fisheries:** This benthic- upper bathyal species inhabits muddy bottoms, at depths from 350 to 1 580 m). The eggs are elongate oval, 14 mm long and 3.5 mm wide with a short, narrow stalk. There are no further data on the biology and ecology of this species. Of no interest to fisheries.

**Distribution:** From Gulf of Mexico and Caribbean Sea to southern Brazil; possibly off Namibian waters.

**Remarks:** This species is included here because a few specimens are very similar to the species described from the Western Atlantic were caught in Namibian waters. However, additional specimens in good condition and certified identity are needed before the species can be considered present in the area.



hectocotylus

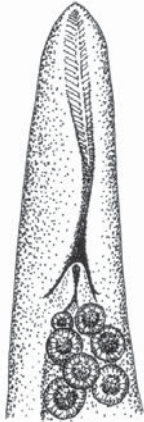
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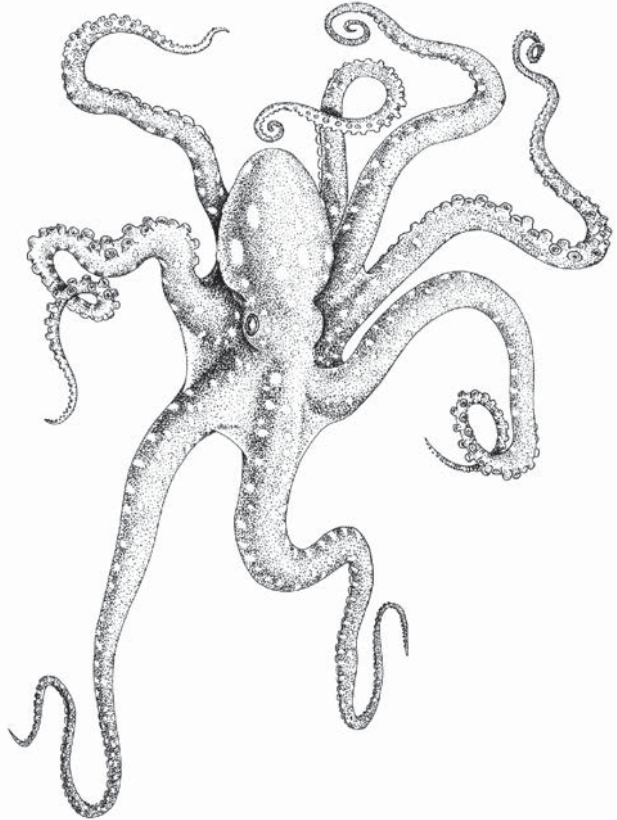
***Callistoctopus macropus* (Risso, 1826)**

**Frequent synonyms / misidentifications:** *Octopus macropus* Risso, 1826 / None.

**FAO names:** **En** – White-spotted octopod; **Fr** – Poulpe tacheté; **Sp** – Pulpo maculado.



hectocotylus



**Diagnostic characters:** Dorsal arms longer and thicker than lateral and ventral arms. Gills with 10 lamellae in outer demibranch. Third right arm hectocotylized in males, ligula relatively large (14% of the hectocotylized arm length) and tubular. **Typically with many white spots on dorsal side of the mantle and arms over a red wine background colour.**

**Size:** Maximum mantle length 155 mm; total length to 950 mm. Weight up to 2 Kg.

**Habitat, biology, and fisheries:** Occurs from 1 to 20 m. Few data on the biology and ecology of this species are available. In the Mediterranean Sea and the North Atlantic this benthic species lives on sand and bottoms covered with rubble; capable to bury in the sand. It is active mainly during the night. Feeds mainly on crustaceans, molluscs and occasionally fishes. In the western Mediterranean males are mature from April and females mature during the summer. In the western Atlantic spawning season extends from winter to early spring; fresh laid eggs measure 4.0 x 1.2 mm; hatchings are planktonic; life span is around 1 year. Of no commercial interest.

**Distribution:** This species was reported to be distributed widely around the world. However, such widespread reports are now considered to refer to a species complex. In the eastern central Atlantic it has been reported from Gibraltar Strait to Cape Town.



*Eledone caparti* Adam, 1950

**Frequent synonyms / misidentifications:** None / *Eledone cirrhosa* (Lamarck, 1798); *E. moschata* and *E. nigra* (Hoyle, 1910).

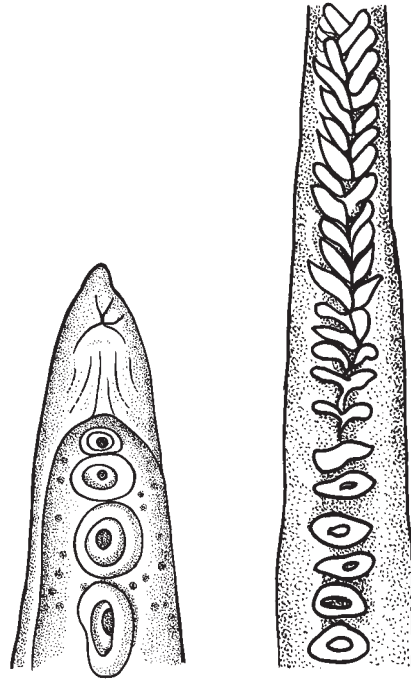
**FAO names:** En – Tropical octopus; Fr – Elédone tropicale; Sp – Pulpo tropical.

**Diagnostic characters:** Body smooth; no supraocular papillae. First arms (I) are from 33 to 50% longer than the second (II), and these considerably longer than III and IV arms. Two rows of flattened plates on end of all arms of male, except hectocotylized arm. Colour grey-lilac or reddish brown, without large dark spots.

**Size:** Up to 95 mm mantle length.

**Habitat, biology, and fisheries:** Found at depths from 40 to approximately 150 m. Very few is known about the biology of this benthic sublittoral species. Egg length 8 to 9 mm. Spermaphores without spines. Egg masses were recorded in the stomachs of blue sharks. Of no interest to fisheries.

**Distribution:** Tropical western Africa from Mauritania and Sierra Leone to Angola.



hectocotylus

modified suckers on arm

(after Nesis, 1987)

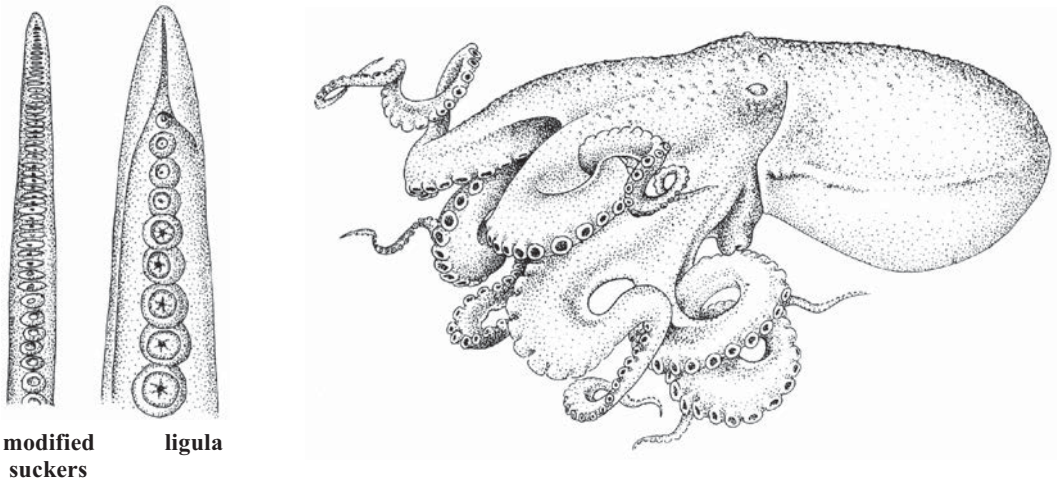




***Eledone cirrhosa*** (Lamarck, 1798)

**Frequent synonymy / misidentifications:** *Eledone aldovrandi* Monfort, 1802 / *Eledone moschata* (Lamarck, 1798); *E. caparti* Adam, 1950.

**FAO names:** **En** – Horned octopus, **Fr** – Elédone commune, **Sp** – Pulpo blanco.



(all illustrations from Guerra, 1992)

**Diagnostic characters:** Mantle ovoid, broad; **skin of mantle, head and arms covered with very fine closely-set granulations, interspersed with larger warts on the dorsal surface.** A pale-coloured ridge around the lateral side of the mantle delimits the dorsal and the ventral sides of the body. **One supraocular papilla on each eye.** Arms moderately short and subequal; suckers uniserial; **suckers of the distal tips of all arms except the hectocotylized (right arm III) modified by being compressed and drawn out into a row of low papillae.** Web moderately deep, from about 21 to 41% of arm length. Right arm III hectocotylized; shorter than the opposite (about 69 to 76%). Ligula very short, 3 to 4% arm length; calamus absent. Eleven filaments per demibranch. Living animals have a yellowish or reddish orange to reddish brown colour dorsally, with diffuse rust-brown patches.

**Size:** Up to 175 mm mantle length and 400 mm total length; maximum weight about 2 kg.

**Habitat, biology, and fisheries:** This coastal benthic species inhabits sandy, detritic and muddy bottoms. Found from 10 to 800 m, mainly abundant between 60 and 300 m. The spawning season extends from May to September, with a peak in July in the western Mediterranean. The reproductive period extends from July to September in the North Atlantic. Males are more precocious than females; mantle length at first maturity is about 125 mm in females while males start maturing at about 50 mm mantle length in the western Mediterranean. Reproductive offshore-inshore migrations were observed. Mature eggs measure 7.5 x 2.5 mm. They are fixed to different substrata on the bottom. Fecundity ranges from 800 to 1 500 eggs in the Mediterranean Sea and between 5 500 and 9 000 in the North Atlantic, depending of female size. Embryonic development lasts 3.5 months at 16°C. Newly hatched octopods measure about 4.5 mm and are planktonic during a period of time variable, related to sea temperature. Growth rates vary inversely with size and seasonally, being directly related to water temperature. In the western Mediterranean, juveniles of about 20 to 25 mm mantle length appear in demersal catches; in spring of the following year females have attained about 90 and 95 mm mantle length, males about 70 mm mantle length. A similar growth pattern was found in the North Sea, off Scotland, but due to overall lower temperature growth is slower maturation process takes longer and animals reach larger sizes. The diet is mainly composed by crustaceans (shrimps, crabs and lobsters), but *Eledone cirrhosa* also prey upon ophiurids, molluscans and fish. Cannibalism has been observed. Post-spawning mass mortality occurs. Life span ranges from 18 to 24 months in the Mediterranean Sea, and it is probably longer in the North Sea probably, but does not last more than 3 years. The unihorn

octopus is a relatively important commercial species. It is taken as bycatch in local trawl fisheries and it is sometimes pooled together with *Octopus vulgaris* in the fishery statistics.

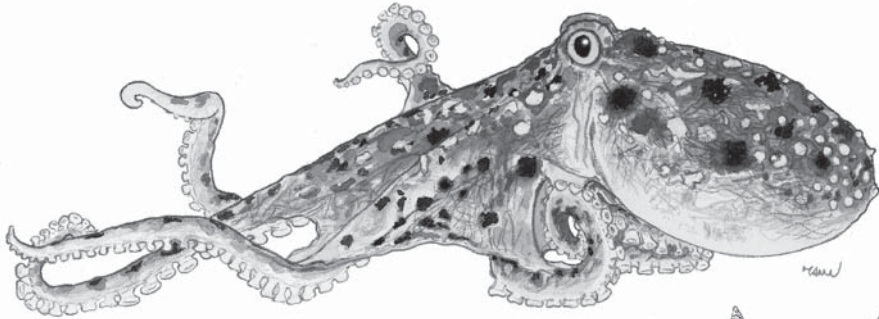
**Distribution:** Mediterranean Sea; eastern Atlantic from approximately 67°N to 33°N. The southern limits of the distribution are not well established; recently the species was recorded from the Canary Islands but this record has not been verified.



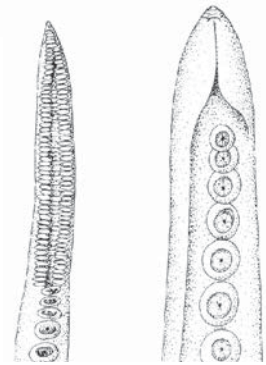
***Eledone moschata*** (Lamarck, 1798)

**Frequent synonyms / misidentifications:** None / *Eledone cirrhosa* (Lamarck, 1798); *E. caparti* Adam, 1950.

**FAO names:** En – Musky octopus; Fr – Elédone musquée; Sp – Pulpo almizclado.



**Diagnostic characters:** Mantle ovoid, moderately broad; skin smooth on the ventral surface and finely granulose on the dorsal surface. **No ridge occurs around the lateral side of the mantle.** Arms subequal, moderately long, up to 22% of mantle length; suckers uniserial; **distal tips of all arms except the hectocotylized (right arm III) modified by subdivision of uniserial suckers into 2 parallel rows of flattened laminae or platelets.** Web moderately deep about 30% of arm length. Right arm III hectocotylized; shorter than the opposite (60 to 70%). Ligula very short, about 3% of the arm length; calamus absent. Eleven or 12 filaments per demibranch. The animals and their ink exude a prominent musk-like odour when alive. Live colour greyish brown, with blackish brown blotches on the dorsal surface of the body.



(from Guerra, 1992)

**modified  
suckers**

**ligula**

**Size:** Maximum mantle length 188 mm and maximum weight about 1.4 kg.

**Habitat, biology, and fisheries:** This coastal benthic species inhabits sandy, detritic and muddy bottoms, from 10 to 350 m, with greatest abundance down to 100 m. The spawning season extend to most part of the year in some geographical areas, while it is more restricted in other areas, with peaks occurring in different seasons and months. Males are more precocious than females and maturity is reached at various different sizes in both sexes. Mating concentrations occur from 60 to 90 m in the western Mediterranean, were reproductive offshore-inshore migrations were observed. Mature eggs measure between 12 and 16 mm in length and 4 to 5 mm in width. They are fixed to different substrata on the bottom. Fecundity ranges between a few hundred and a few thousand eggs (up to 2 896 in a female from the Aegean Sea), depending on the females size. Embryonic development takes 6 months at 10 to 15°C. Newly hatched octopods have a mantle length from 10 to 12 mm and are benthic from the most early stages of development, their aspect form and behaviour resemble those of the adults. Life span of this species ranges between 15 and 23 months. The diet in mainly composed by crustaceans. Post-spawning mass mortality has been observed. Temperature limits seem to be comprised between 12° and 23°C. This species has a "social" behaviour and has been observed to form a size-based dominance hierarchy in captivity. It is a relatively important commercial species, mainly in the Mediterranean Sea. It is taken as bycatch in local trawl fisheries and it is sometimes pooled together with *Octopus vulgaris* in the fishery statistics. There are significant differences of abundance among major areas, depth strata and season.

**Distribution:** Mediterranean Sea; in the Atlantic Ocean it was recorded off the Portuguese coast in the Gulf of Cadiz and north of Morocco.



***Graneledone verrucosa* (Verrill, 1881)**

**Frequent synonyms / misidentifications:** *Graneledone verrucosa verrucosa* and *G. verrucosa media* Joubin, 1918 / None.

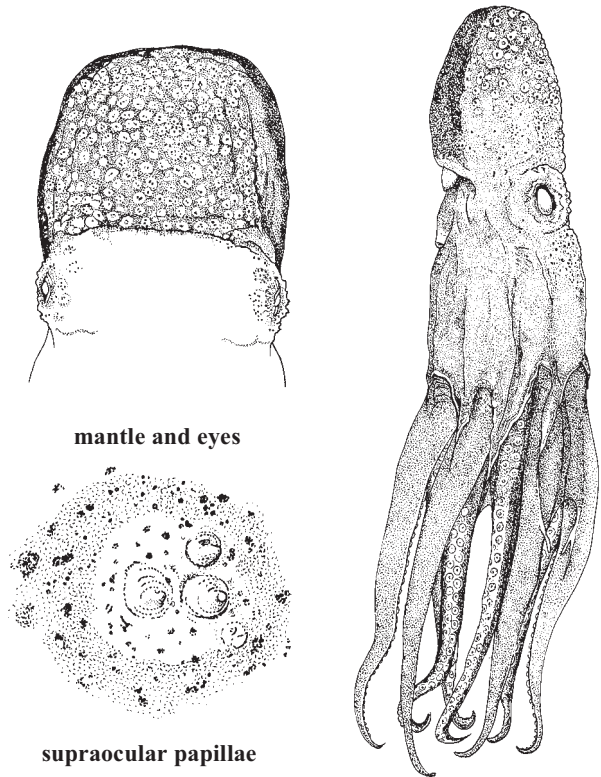
**FAO names:** **En** – Warty octopus; **Fr** – Poulpe verruqueux; **Sp** – Pulpo verrugoso.

**Diagnostic characters:** Ink sack absent; 1 row of suckers on arms. Mantle broadly ovoid. Arms 2.5 to 3 times as long as body. No enlarged suckers. Funnel organ VV-shaped. Third right arm hectocotylized. Hectocotylus of moderate size. Ligula small, simple, without transverse ridges, about 3.5 to 7% of the hectocotylized arm length. Gills small with 6 to 8 lamellae on each demibranch. Dorsal body surface covered in complex papillose warts. **These warts consist of approximately 4 to 10 cone-shaped tubercles, 22 to 26 clusters across dorsal mantle, 12 to 16 clusters in transverse line between orbits. Multiple warts surround the eye, and 2 or 3 particularly large supraocular warts.**

**Size:** Total length to 500 mm.

**Habitat, biology, and fisheries:** Benthic-bathyal species. Found approximately from 550 to 2 900 m. Biology unknown. Of no interest to fisheries.

**Distribution:** North Atlantic, on the mid-Atlantic Ridge; northeast Atlantic: off Iceland, Porcupine Seabight, Rockall Trough, west of Hebrides and Bassin du Cape Verde; northwest Atlantic: from southern New England to cape Hatteras.



(all illustrations after Allcock *et al.*, 1910)



***Macrotritopus defilippi* (Vérany, 1851)**

**Frequent synonyms / misidentifications:** *Macrotritopus dana* Robson, 1929; *M. kemp* Robson, 1921 / None.

**FAO names:** **En** – Lilliput longarm octopus; **Fr** – Poulpe à longs bras; **Sp** – Pulpo patilargo.

**Diagnostic characters:** Mantle small in relation to total length, elongate or saccular. Funnel organ W-shaped, slender, posterior angles rounded.

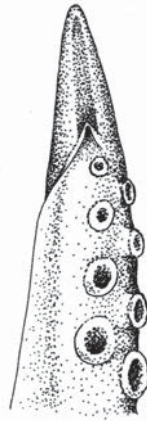
**Arms very long, 85 to 90% of total length, slender, often conspicuously asymmetrical** (each arm may be much longer than the opposite arm of same pair). Enlarged suckers absent in both sexes. Right arm III of male hectocotylized, shorter than the opposite, bears 60 to 100 suckers. Ligula short, 1.9 to 2.5% of the hectocotylized arm length. Gills with 11 lamellae per outer demibranch. Papillae transient except over eyes. Colour in life brown-yellow, grey brown or red-brown with dark transverse arm bars and hearth shaped pattern on dorsal mantle, often with greenish iridescence, especially around eyes.

**Size:** Up to 90 mm mantle length; total length to about 400 mm.

**Habitat, biology, and fisheries:** A benthic species taken on sandy and muddy bottoms. Usually it occurs from the littoral waters (about 6 m) to 200 m depth, but occasionally has been reported down to 350 m. Females lay over 10 000 eggs that may be brooded in the arms. Mature egg-size ranges between 0.9 and 1.6 mm. Larvae and juveniles are pelagic, and are characterized by extremely long ventrolateral arms. The characteristic long arms of the planktonic young seem to function in flotation, feeding, crawling and defense. No directed fisheries.

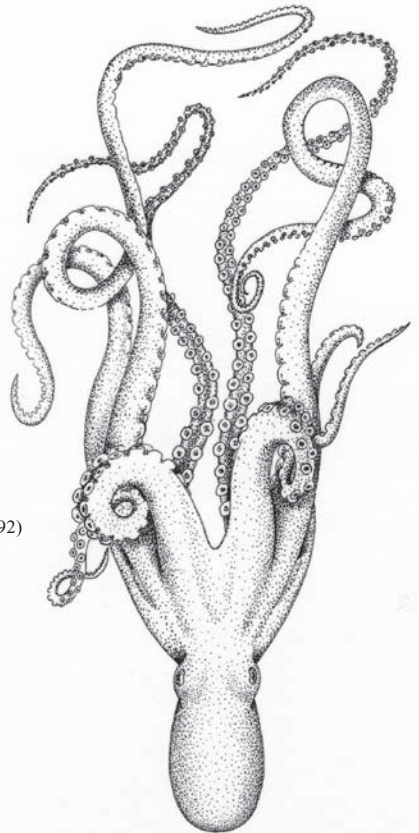
**Distribution:** Throughout the Mediterranean Sea, eastern Atlantic from South Portugal to Angola, Cape Verde Islands. Western Atlantic from the Bahamas to Brazil, in the Gulf of Mexico and the Caribbean Sea.

**Remarks:** The genus *Macrotritopus* needs revision. At present the only entirely described species is the one living in the Mediterranean and the eastern Atlantic, but the unresolved species of the western Atlantic are treated under the same name. The very characteristic "*Macrotritopus* larvae" have been found off South Africa and in the Indo-West Pacific, suggesting that several species may be comprised within this genus.



hectocotylus

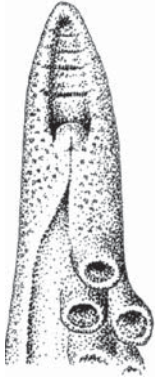
(illustrations from Guerra, 1992)



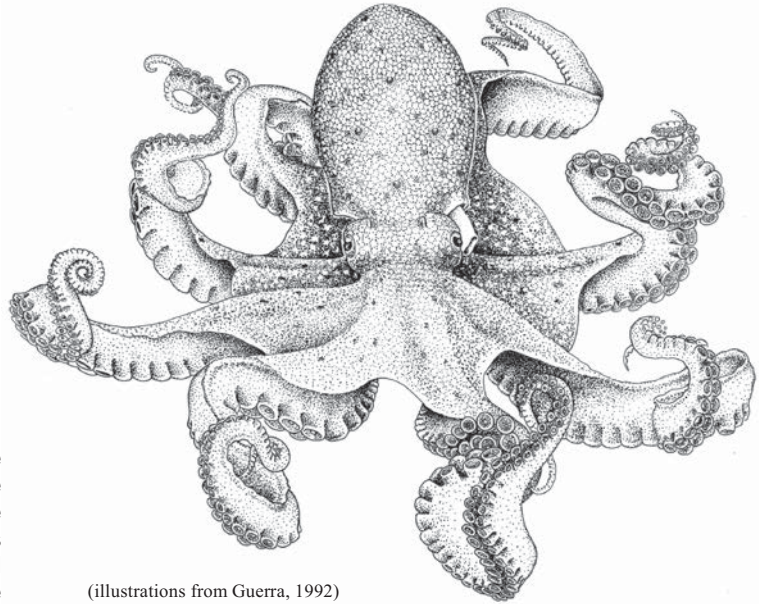
***Octopus vulgaris* Cuvier, 1797**

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

**FAO names:** **En** – Common octopus; **Fr** – Pieuvre; **Sp** – Pulpo común.



ligula



(illustrations from Guerra, 1992)

**Diagnostic characters:** Mantle muscular, sac-shaped. Mantle opening wide, surpassing the lateral edges of the mantle. Arms robust at the base, the lateral ones being the longest and the dorsal ones the shortest. Arms with 2 rows of suckers. **Suckers**

**15 to 17 on the arms II and III enlarged in adults, especially in males.** Right arm III of males hectocotylized; ligula short (2.5 times of the arm length) and spoon-shaped. A total of 7 to 11 lamellae on outer side of the gill. **Four papillae on the dorsal surface of the mantle** (in a diamond arrangement). One papilla over each eye. Reticulated skin with 4 whitish spots, 2 between the eyes and 2 below the first dorsal papilla.

**Size:** Up to 400 mm mantle length and 1.8 m total length in the eastern Atlantic. Up to 250 mm mantle length in the Mediterranean.

**Habitat, biology, and fisheries:** The common octopod occurs from very shallow, littoral waters (about 5 m depth) to the border of the continental shelf (200 m approximately). The majority of the available biological data on benthic octopods concern the common octopus. It undertakes limited seasonal migrations. No segregation between sexes was observed in the central-eastern Atlantic population. Potential fecundity in mature females ranges between 100 000 and 400 000 oocytes. Eggs are small, about 2.5 x 1 mm long. Females attach the eggs to several substrates, mainly rocks, and brood the eggs until hatching. The spawning season extends throughout the year, with 2 peaks in spring and autumn in the Atlantic populations. Egg stage duration depends on the temperature; it lasts from 20 to 25 days at 25° C and 125 days at 13° C. Hatchlings measure from 1 to 2 mm mantle length and stay in the water column (planktonic stage) for about 2 or 3 months. *Octopus vulgaris* are simultaneous terminal spawners, therefore populations are typically unstable and respond rapidly to changes in environmental conditions. The diet is composed by bony fishes, crustaceans, cephalopods, bivalves and polychaeta. The species is preyed upon by a variety of predators, including sharks, bony fishes, sea birds and marine mammals. Cannibalism has been observed. Growth is very fast and temperature dependent. Life span was estimated in 2 years for males and females. The natural mortality of cephalopods during the paralarval and settlement stages is high and it is associated with environmental factors, which ultimately control the abundance of food for the paralarvae (zooplankton). Upwelling conditions are related to strong recruitment of *Octopus vulgaris* in Mauritanian and Galician (northwest Spain) waters. *Octopus vulgaris* is the most abundant and ubiquitous cephalopod species occurring on the Saharan Bank (northwest Africa, from 21°N to 26°N). In this area, there are probably 2 stocks, 1 off Dakhla (26°N to 23°N) and the other off Cape Blanc (21°N to 19°N). The first one is overexploited

while the second one is relatively underexploited. The common octopus of the Nouakchott area probably constitutes a third stock. *Octopus vulgaris* is taken throughout the year as a target species by bottom trawls and by the creel artisanal coastal fishery, at depths between 20 and 200 m in the Mediterranean, off West Africa and the northeastern Atlantic. Most of the catches in the eastern central Atlantic were reported as *octopus nei*, but the majority corresponded to *O. vulgaris*. Some experiences of culture have been undertaken mainly in Spain and Japan.

**Distribution:** This species is especially abundant in the Mediterranean Sea and the eastern Atlantic. Although *O. vulgaris* was reported to be a cosmopolitan species from tropical, subtropical and temperate waters, its distribution is currently being redefined to conform to modern biogeographical boundaries.



***Pteroctopus tetracirrhus* (Delle Chiaje, 1830)**

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

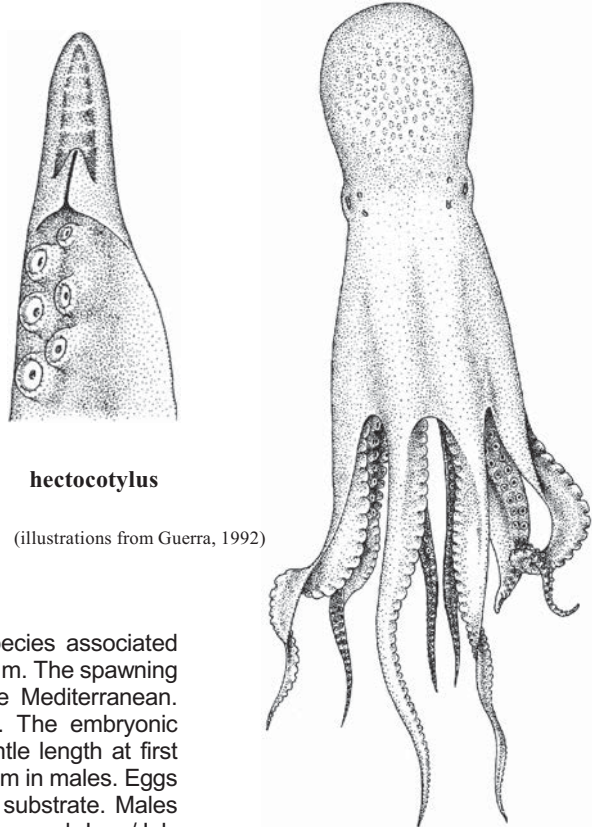
**FAO names:** En – Fourhorn octopus; Fr – Poulpe à quatre cornes; Sp – Pulpo cuatro cuernos.

**Diagnostic characters:** Mantle sac-like, usually as broad as long. **Skin and subcutaneous tissue gelatinous. Two long and slender papillae over each eye.** Funnel organ W-shaped. Mantle aperture narrow. Arms 3 to 4 times longer than mantle. Suckers in 2 rows with a maximum diameter 4 to 6% of mantle length. Web deep up to 40% of the longest arm. Body covered with low closely-set tubercles. Left third arm hectocotylized in males, stouter and shorter (from 69 to 80%) than the opposite one. Ligula large (5 to 11% of the arm length) and broadly conical, with shallow groove and faint transverse ridges. Calamus medium-sized, conical and deeply grooved. Nine or 10 filaments per outer demibranch of gill.

**Size:** Maximum mantle length 130 and 110 mm for females and males, respectively.

**Habitat, biology, and fisheries:** Benthic species associated with muddy bottoms, at depths from 25 to 720 m. The spawning season occurs mainly during summer in the Mediterranean. Egg-size ranges between 6.5 and 8.3 mm. The embryonic development lasts about 2 to 3 months. Mantle length at first maturity is about 110 mm in females and 85 mm in males. Eggs are hatched individually and attached to the substrate. Males and females mature subsequently in May/June and June/July respectively. Young immature individuals appear in the catches by November and December. Medium size individuals are taken in April in demersal catches. Life span is about 2 to 3 years. Species of minor interest to fisheries, taken as bycatch in shrimp or finfish trawling operations in the western Mediterranean and the western Atlantic. Not registered in the official statistics.

**Distribution:** Mediterranean and eastern Atlantic from 40°N to 4°S. It is reported in the western Atlantic from North Carolina to Uruguay, including the Caribbean Sea; however, these are probably related forms of unresolved status (Norman *et al.*, in preparation, FAO Catalogue vol. III).



**hectocotylus**

(illustrations from Guerra, 1992)

**dorsal view**

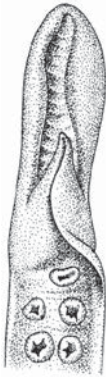




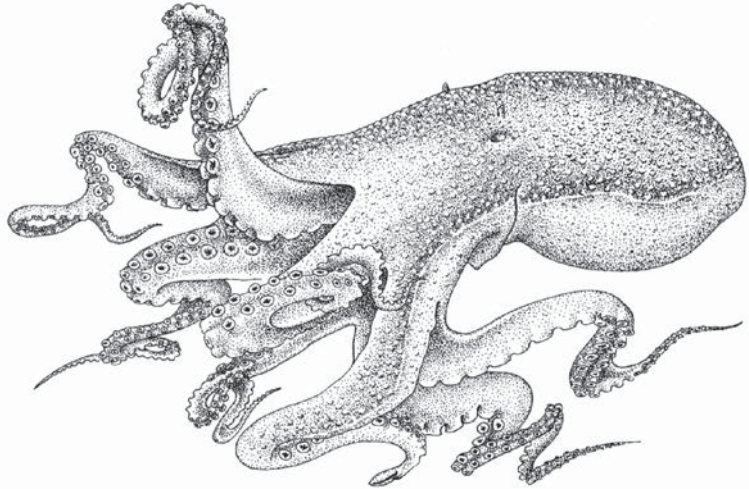
***Scaevirus unicirrhus* (Delle Chiaje, 1841)**

**Frequent synonyms / misidentifications:** Unresolved issue, *Scaevirus patagiatus* Berry, 1913 / None.

**FAO names:** **En** – Unihorn octopus; **Fr** – Poulpe licorne; **Sp** – Pulpo unicornio.



hectocotylus



(illustrations from Guerra, 1992)

**Diagnostic characters:** **Body covered with round papillae or warts that may coalesce and form linear ridges. A lateral skin ridge around the mantle separates the ventral and dorsal sides. Single papillae over each eye.** Arms moderately long (61 to 85% of the ML) and web deep (20 to 30% of the arm length). Left arm III of male hectocotylized and markedly shorter than the opposite one. Ligula large (8 to 10% of the arm length), spoon shaped with swollen heavily infolded margins, deep groove and transverse striae. Calamus large, acutely conical with a deep groove. Funnel organ W-shaped. Eleven to 14 gill lamellae per outer demibranch. Two pairs of large black spots may be present on the dorsal mantle. Translucent green iridescence on the ventral side of the mantle present in still alive or barely dead specimens.

**Size:** Maximum mantle length 120 mm. Common from 70 to 80 mm.

**Habitat, biology, and fisheries:** Benthic species associated with sandy and coralline bottoms of seamounts and continental slopes, at depths from 50 to 500 m. Males mature at 50 mm mantle length in the western Mediterranean and spawning seems to occur in summer although in tropical waters it could be extended all year round. Mature eggs are about 2 mm long. Hatchlings are planktonic. Spermatophores are long and the sperm mass makes up to about 72% of spermatophore length. This species feeds on small fishes, crustaceans and molluscs. The interest to fisheries is presently unassessed but a regional potential is believed to exist, in some regions.

**Distribution:** Mediterranean Sea and Atlantic Ocean. Present area: off Namibia.

**Remarks:** The species name is retained here as the valid one for specimens from Namibia waters, until the examination of additional material will help clarify the still not entirely clear situation of the genus and its species in the Atlantic Ocean.



## OCYTHOIDAE

### Football octopods

This monotypical famioy contains a single species. Consequently, diagnostic characters, habitat, biology and interest to fisheries coincide.

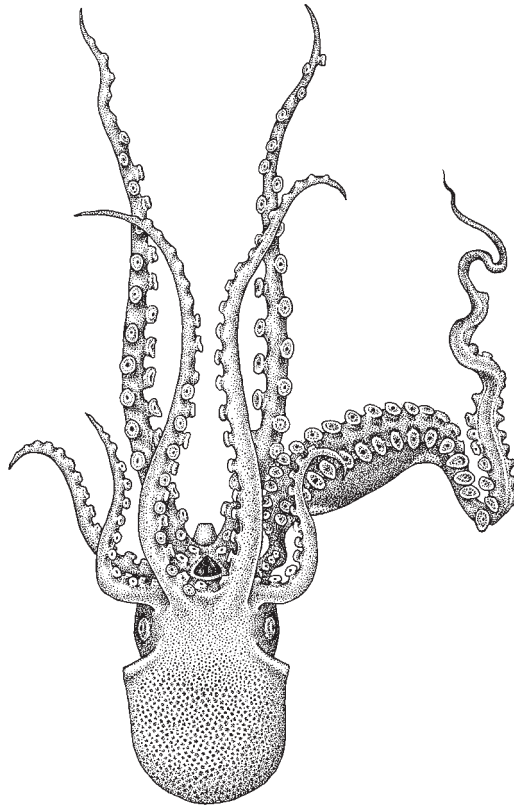
*Ocythoe tuberculata* Rafinesque, 1814

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

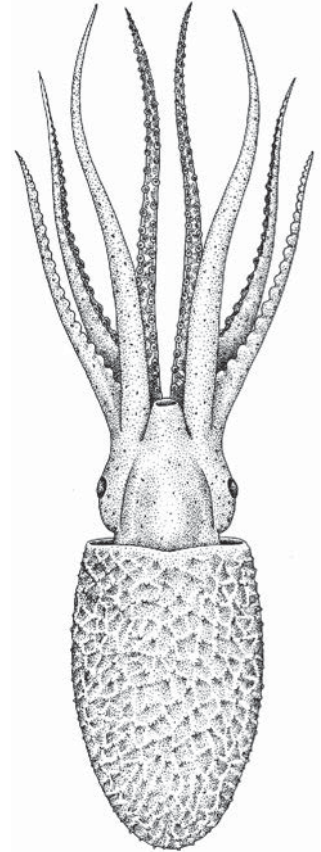
**FAO names:** En – Football octopod; Fr – Poulpe balonné; Sp – Pulpo abalonado.



hectocotylus



male  
dorsal view



female  
ventral view

(all illustrations from Guerra, 1992)

**Diagnostic characters:** Species with a marked sexual dimorphism. Females much larger than males with a firm, sac-like and muscular mantle. **Ventral side of mantle in adult females with reticular sculpture of crossing skin ridges and tubercles at crossing points.** A hydrostatic organ is reported to be located inside the mantle cavity on dorsal side. **One pair of cephalic water pores** on ventral part of head at the base of IV arms. Funnel very long, surpassing the base of the arms, locking cartilages knob-like. Arms long, I and IV much longer than II and III arms. Suckers small in 2 rows. No web, no arm fringe. Males small, III right arm hectocotylized. Hectocotylus with a very long slender “penis”, retracted in a sac and with suckers in 2 rows. Females with 34 and males with 21 gill lamellae.

### Similar families occurring in the area

This family was included by Naef (1923) in the superfamily Argonautoidea together with Argonautidae, Alloposidae and Tremoctopodidae. These 4 families are primarily distinguished from the rest of octopods by an unusual means of copulation which involves transferring a detached hectocotylus from the male to the female. Also, males usually are much smaller than females and dwarf in 3 over 4 families. Ocythoidae females do not produce calcareous shells. They can be distinguished from Tremoctopodidae because they do not have a well-developed web between arms I and II. Alloposidae have a gelatinous consistency and the ventral surface of the mantle is not covered by tubercles interconnected by ridges.

**Size:** Up to 310 and 30 mm mantle length for females and males, respectively.

**Habitat, biology, and fisheries:** An epipelagic species; occurs from the surface down to 200 m. *Ocythoe* is the only known ovoviviparous cephalopod, i.e. gives birth to live young that hatch internally; females incubate eggs in the oviducts until paralarvae hatch. The hectocotylus is freed from males and penetrates actively in the mantle of the female. A female of 170 mm mantle length had about 170 000 oocytes at different stages of development in the ovary. The smallest oocytes measured 0.1 to 0.15 mm, oocytes of 0.2 mm predominated. There were about 28 000 eggs in the oviducts. Freshly fertilized eggs (2.3 to 2.5 x 1.2 to 1.3 mm) were situated in the proximal part of the oviducts. Total fecundity was about 200 000 oocytes. Larger animals could reach a total fecundity of about 1 million oocytes. Males utilize the test of salps to reside within the cavity. Of no interest to fisheries.

**Distribution:** Cosmopolitan in temperate latitudes.



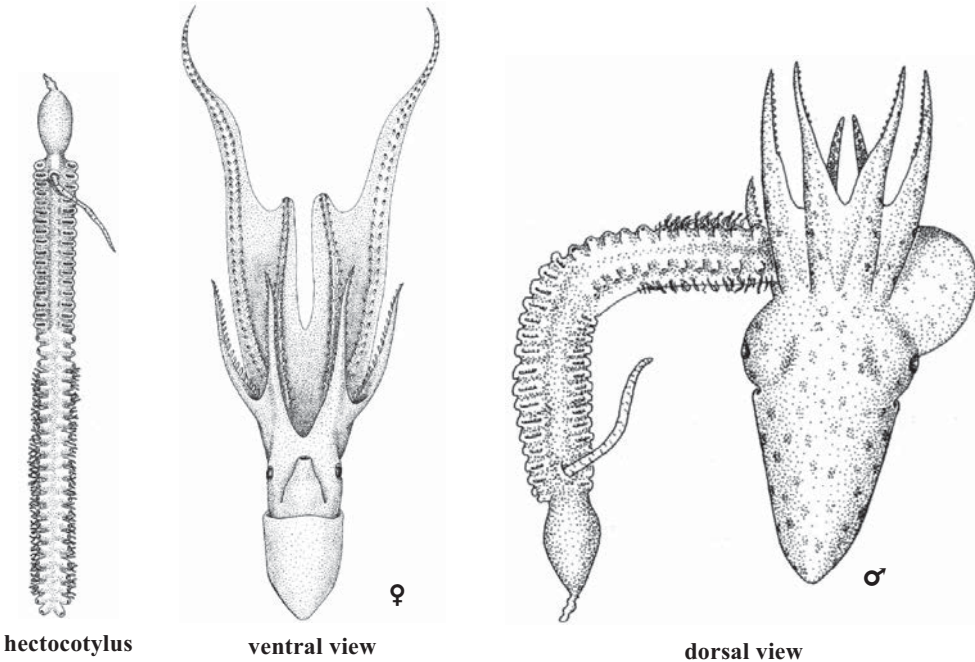
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TREMOCTOPODIDAE

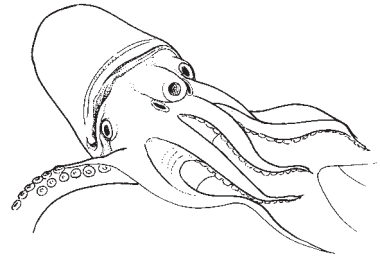
Blanket octopods

Diagnostic characters: In females the dorsal (I) and dorsolateral (II) arms are distinctly longer than arms III and IV and are connected by an extensive web which is absent from the other arms. Water pores present at base of dorsal and ventral arms. Males are dwarfs. Hectocotylus develops in sac buried beneath right eye; the proximal half of hectocotylus has papillate lateral fringes. Hydrostatic organ (swim bladder) present dorsal to digestive system.

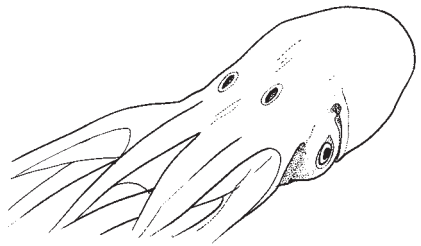


(from Guerra, 1992)

Habitat, biology, and fisheries: Most species occupy surface waters of tropical and subtropical oceans and seas. Females carry numerous (100 000 to 150 000) small eggs (0.9 X 1.5 mm in size). The eggs are attached to a sausage-shaped rod held at the base of the dorsal arms and carried by the female until hatching. The hatchling has the arm bases in a cuff. Young individuals carry broken tentacles of different species of jellyfish on the suckers of the dorsal 4 arms, which presumably have a defensive and/or offensive function. Large ocelli can be displayed on the dorsal web. This web and the slender tip of the arms can, apparently, be autotomized along visible "fracture" lines. Of no interest to fisheries.



female ventral water pores




female dorsal water pores

**Remarks:** The systematics of the Tremoctopodidae was review by Thomas (1977). He concluded that 2 species existed, *Tremoctopus violaceus* and his new species *T. gelatus* Thomas, 1977. The former species he divided into 2 subspecies, *Tremoctopus violaceus violaceus*, from the Atlantic Ocean and *Tremoctopus violaceus gracilis*, from the Pacific and Indian Oceans. In agreement with the decision by Mangold *et al.* (2010), we consider the 2 subspecies to be true species, and the family as composed by 4 species: *T. gelatus*, *T. gracilis*, *T. robsoni* and *T. violaceus* is the only species present in the area.

The main differences between Tremoctopodidae and the other 3 families of Argonautoidea Naef, 1912 are:

- a) Dorsal 4 arms (pairs I and II) much more longer than ventral 4 arms (III and IV).
- b) Presence of water pores at the base of dorsal and ventral arms versus water pores only present at the base of arms IV in both sexes (Ocythoidae) or no water pores (Argonautidae and Alloposidae).
- c) Deep web present between dorsal 4 arms (pairs I and II) versus no web in Argonautidae and Ocythoidae and extensive web between all arms.
- d) The morphology of hectocotyli.

### List of species occurring in the area

The symbol  is given when species accounts are included.

 *Tremoctopus violaceus* Delle Chiaje, 1830.

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***Tremoctopus violaceus*** Delle Chiaje, 1830

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

**FAO names:** **En** – Violet blanket octopus; **Fr** – Poulpe manteau violet; **Sp** – Pulpo manta violáceo.

**Diagnostic characters:** **Body muscular** with mantle ventrally smooth. Presence of 2 pairs of water pores at the bases of first and fourth pair of arms. Dorsal and dorsolateral arms much longer than third and fourth arms, enclosed in a bilobed web. A total of 13 to 16 gill filaments in demibrach of female and 9 to 11 in male. There are 15 to 19 pairs of transverse suckers on the distal portion of the hectocotyized arm. In adult females **ocellar spots arranged in 1 row outer side of fringe** of first pair of arms. Adult females dark blue-purple dorsally and light golden ventrally; males and juveniles bright with small dark points.

**Size:** Females up to approximately 1 m total length; males dwarfs, to at least 15 mm mantle length (maximum TL about 40 mm).

**Habitat, biology, and fisheries:** Epipelagic circumtropical species living in warm-temperate surface waters (from 0 to approximately 100 m). It has been observed swimming just above the shallow ocean floor with the web extended. Potential fecundity varies between 100 000 and 300 000 eggs. *Tremoctopus violaceus* is an intermittent terminal spawner. Batch fecundity is 10 000 to 30 000 eggs, but at the beginning and the end of spawning the batches are smaller. Generally, total duration of individual spawning might be estimated as no more than 0.5 to 1 months. Eggs are carried by the female on the first pair of arms until hatching. Juveniles have been observed to attach numerous fragments of tentacles of *Physalia* and other jellyfish species to the suckers of the dorsal arms. These fragments probably could be used as both defensive mechanisms and offensive weapons. It has been suggested that when in use, the web may form a straining mechanism and that with the *Physalia* tentacle fragments, it becomes armed with nematocysts. Of no interest to fisheries.

**Distribution:** Mediterranean Sea. Atlantic Ocean from 40°N to 35°S and Caribbean Seas.



female dorsal view



## VITRELEDONELLIDAE

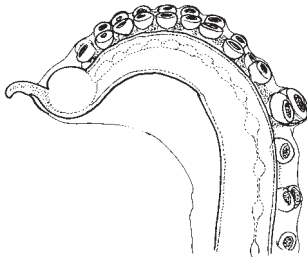
### Glass octopods

A single species in the family.

*Vitreledonella richardi* Joubin, 1918

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

**FAO names:** En – Glass octopod; Fr – Poulpe vitreux; Sp – Pulpo vitreo.



hectocotylus

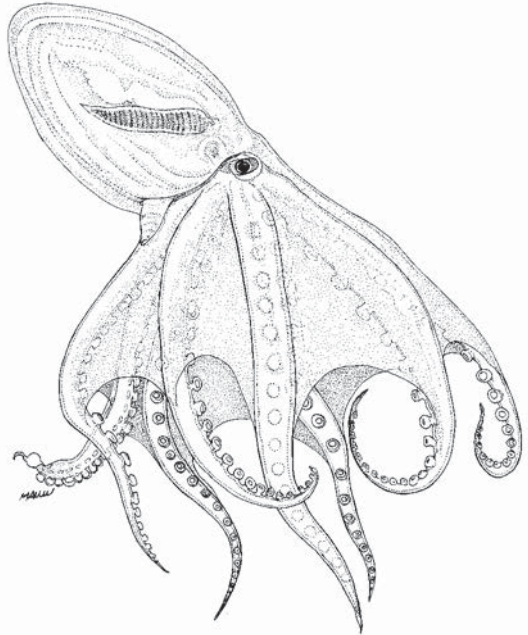
**Diagnostic characters:** Body transparent as glass and almost colourless, gelatinous. Mantle aperture very wide. **Eyes dark, almost rectangular, their length about 20% of the mantle length. Optic nerves** (which can be observed from transparency in life and well preserved specimens) **long and optic ganglia not in close proximity to brain.** Ink sac developed. Gill with external demibranch only. Arms of medium length, in adults about 2 or 3 times longer than mantle. Suckers in 1 row, widely apart within the web, closely set and largely enlarged outside the web. Web depth in adults 40 to 60% of the longest arm length. **Left ventrolateral (III) arm hectocotylized and smaller than opposite arm in males.** The hectocotylus has a spherical (oval) vesicle with a slender papilla at its tip. Ligula short. Digestive gland long and slender. Stomach dorsal to digestive gland.

**Size:** Up to 110 mm mantle length and 450 mm total length.

**Habitat, biology, and fisheries:** Epi-meso-bathypelagic species. Juveniles found between 100 and 200 m depth; adults around 1 000 m depth. This species inhabits waters within a range of temperature between 12 and 16°C. Animals do not undertake important diel vertical migrations; they maintain the digestive gland in a vertical orientation as they swim. Supposedly viviparous forms brooding the eggs up to the hatching of larvae. Frequently found in the stomach contents of tunas and swordfishes. Of no interest to fisheries.

**Distribution:** Tropical and subtropical cosmopolitan.

**Remarks:** At the time of going to print, Strugnell et al. (2013) used molecular evidence to merge the families Amphitretinae, Bolitaeninae and Vitreledonellinae into a single family, Amphitretidae.



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# INDEX OF SCIENTIFIC AND VERNACULAR NAMES

## Explanation of the System

*Italics* : Valid scientific names (double entry by genera and species)

*Italics* : Synonyms, misidentifications and subspecies (double entry by genera and species)

**ROMAN** : Family names

ROMAN : Scientific names of divisions, classes, subclasses, orders, suborders and subfamilies

Roman : FAO names

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This multivolume field guide covers the species of interest to fisheries of the major resource groups exploited in the Eastern Central Atlantic. The area of coverage includes FAO fishing area 34 and part of 47. The marine resource groups included are bivalves, gastropods, chitons, cephalopods, stomatopods, shrimps, lobsters, crabs, hagfishes, sharks, batoid fishes, chimaeras, bony fishes and sea turtles. The introductory chapter outlines the environmental, ecological, and biogeographical factors influencing the marine biota, and the basic components of the fisheries in the Eastern Central Atlantic. Within the field guide, the sections on the resource groups are arranged phylogenetically according to higher taxonomic levels such as class, order, and family. Each resource group is introduced by general remarks on the group, an illustrated section on technical terms and measurements, and a key or guide to orders or families. Each family generally has an account summarizing family diagnostic characters, biological and fisheries information, notes on similar families occurring in the area, a key to species, a checklist of species, and a short list of relevant literature. Families that are less important to fisheries include an abbreviated family account and no detailed species information. Species in the important families are treated in detail (arranged alphabetically by genus and species) and include the species name, frequent synonyms and names of similar species, an illustration, FAO common name(s), diagnostic characters, biology and fisheries information, notes on geographical distribution, and a distribution map. For less important species, abbreviated accounts are used. Generally this includes the species name, FAO common name(s), an illustration, a distribution map, and notes on biology, fisheries, and distribution. Each volume concludes with its own index of scientific and common names.

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