



Key to
Shrimps
and
Lobsters

R N Burukovskii

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R.N. Burukovskii has presented interesting data on decapods—shrimps, spiny lobsters, and rock lobsters. The major commercial stocks of these crustaceans are found on the continental shelves and slopes in tropical and subtropical seas. The morphology of these decapods has been described in detail and a large number of keys to species, genera, and families compiled.

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R.N. BURUKOVSKII

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PREFACE

Decapods constitute the most important group in nonfish catches by commercial fishermen and hence their detailed study is essential to the fishing industry. The available literature provides identification keys mainly for regional decapod fauna: *Key to Shrimps, Crayfishes, and Crabs of the Far East* (Vinogradov, 1950); *Key to the Fauna and Flora of the Northern Seas* (Gaevskaya, 1948); and *Key to the Decapod Fauna of the Black and Azov Seas* (Kobyakova and Dolgopol'skaya, 1969).

The keys included in the present book cover the tropical and subtropical decapods which are currently exploited and potentially important for the fishing industry. Keys translated earlier by the author for several groups of decapods have been incorporated: the classification of the subfamilies of all decapods published by Balss (1957); the key to shrimps compiled by Anderson and Lindner (1945), considered one of the most important publications of the twentieth century (G. Gunter, 1957) even though it covers primarily American fauna, has now become obsolete in certain aspects; and the key to extant genera of caridean and stenopodidean shrimp published by Holthuis (1952).

These publications have been somewhat revised or supplemented in keeping with more recently published data. A number of keys to the regional fauna of different groups of decapods have been incorporated. For one series of the crustacean group (rock lobsters, spiny lobsters, etc.), however, keys had to be formulated on the basis of original descriptions (identifications) of genera and species, since no keys were available for them.

Unfortunately, the present keys cannot be considered comprehensive. A few facts and figures reveal the reasons for this deficiency. The order Decapoda presently comprises 1,001 genera with 8,321 species (Balss, 1957) but these figures have increased significantly with every passing year. Shrimps now include about 230 genera with about 2,000 species. Of these, 33 genera in the tribe Penaeidea alone (excluding fossils) comprise more than 320 species. This in itself indicates that the task of compiling a comprehensive key assumes rather herculean proportions! Hence the format of the classification given here is perforce unique. Keys up to the level of subfamilies and exhaustive keys up to the level of genera have been given for all the known shrimps, spiny lobsters, and rock lobsters. Keys up to the level of species are provided for almost all the genera of shrimp of families Stenopodidea and Penaeidea, as well as families of

spiny lobsters and rock lobsters. Despite its lack in species identifications for every genus of decapods, the present classification remains the most comprehensive of all the known keys for this group of crustaceans in existence to date.

CONTENTS

PREFACE	vii
I. PRINCIPAL MORPHOLOGICAL FEATURES OF DECAPOD CRUSTACEANS (CRUSTACEA, DECAPODA)	1
II. TAXONOMY OF ORDER DECAPODA LATREILLE	17
Suborder Natantia Boas, 1880	17
Tribe Penaeidea de Haan, 1849	17
Family Penaeidae Dana, 1852	18
Family Sergestidae Dana, 1852	18
Subfamily Penaeinae Dana, 1852	18
Genus <i>Penaeus</i> Fabricius, 1798	20
Genus <i>Funchalia</i> Johnson, 1867	30
Genus <i>Xiphopenaeus</i> Smith, 1869	31
Genus <i>Parapenaeus</i> Smith, 1885	31
Genus <i>Parapenaeopsis</i> (Alcock), 1901	33
Genus <i>Atypopenaeus</i> Alcock, 1906	36
Genus <i>Trachypenaeopsis</i> Burkenroad, 1934	37
Genus <i>Trachypenaeus</i> Alcock, 1901	37
Genus <i>Penaeopsis</i> (Bate, 1881)	41
Genus <i>Metapenaeopsis</i> Bouvier, 1905	41
Genus <i>Metapenaeus</i> Wood-Mason and Alcock, 1891 ..	53
Subfamily Solenocerinae Wood-Mason, 1891	58
Genus <i>Solenocera</i> Lucas, 1849	58
Genus <i>Haliporus</i> Bate, 1881	60
Genus <i>Hymenopenaeus</i> Smith, 1882	60
Subfamily Benthescyminae Bouvier, 1908	62
Genus <i>Bentheogennema</i> Burkenroad, 1936	63
Subfamily Aristaeinae Alcock, 1901	63
Genus <i>Hepomadus</i> Bate, 1881	63
Genus <i>Hemipenaeus</i> Bate, 1881	64
Genus <i>Plesiopenaeus</i> Bate, 1881	64
Genus <i>Aristeus</i> Duvernoy, 1840	65
Subfamily Sicyoninae Ortmann, 1890	66

One genus: <i>Sicyonia</i> H. Milne-Edwards, 1830	66
Tribe Caridea Dana, 1852 (-Eucyphidea)	70
Family Oplophoridae Kingsley, 1878	73
Family Atyidae Dana, 1852	75
Family Pasiphaeidae Dana, 1852	81
Family Rhynchocinetidae Ortmann, 1890	82
Family Bresiliidae Calman, 1896	82
Family Campylonotidae Sollaud, 1913	83
Family Palaemonidae Samouelle, 1819	84
Subfamily Palaemoninae Dana, 1852	85
Subfamily Pontoniinae Kingsley, 1878	89
Family Gnathophyllidae Ortmann, 1890	100
Family Alpheidae Bate, 1888	101
Family Hippolytidae Bate, 1888	107
Family Pandalidae Bate, 1888	115
Family Processidae Ortmann, 1898	121
Family Crangonidae Bate, 1888	121
Tribe Stenopodidea Bate, 1888	126
Family Stenopodidae Huxley, 1878	126
Genus <i>Stenopus</i> Latreille, 1819	130
Genus <i>Odontozona</i> Holthuis, 1946	131
Genus <i>Richardina</i> A. Milne-Edwards, 1881	131
Genus <i>Engystenopus</i> Alcock and Anderson, 1894	131
Genus <i>Microprosthema</i> Stimpson, 1860	132
Genus <i>Spongicola</i> de Haan, 1849	132
Genus <i>Spongicoloides</i> Hansen, 1908	132
Suborder Reptantia Boas, 1880	133
Section Palinura Borradaile, 1907	133
Tribe Eryonidea de Haan, 1844	134
Family Polychelidae Wood-Mason, 1877	134
Tribe Scyllaridea Borradaile, 1870	135
Family Palinuridae Gray, 1847	135
Genus <i>Jasus</i> Parker, 1884	137
Genus <i>Palinurellus</i> van Martens, 1878	137
Genus <i>Palinurus</i> Fabricius, 1798	138
Genus <i>Palinustus</i> A. Milne-Edwards, 1881	138
Genus <i>Justitia</i> Holthuis, 1946	138
Genus <i>Puerulus</i> Ortmann, 1897	138
Genus <i>Panulirus</i> White, 1847	139
Family Scyllaridae White, 1847	143
Genus <i>Ibacus</i> Leach, 1815	143
Genus <i>Arctides</i> Holthuis, 1960	144
Genus <i>Parribacus</i> Dana, 1852	144
Genus <i>Scyllarides</i> Gill, 1898	145

Genus <i>Scyllarus</i> Fabricius, 1775	146
Section Astacura Borradaile, 1907	151
Family Homaridae*	151
Genus <i>Homarus</i> Weber, 1795	152
Genus <i>Eunephrops</i> Smith, 1885	152
Genus <i>Enoplometopus</i> A. Milne-Edwards, 1862	153
Genus <i>Nephropsis</i> Wood-Mason, 1872	153
Genus <i>Nephropides</i> Manning, 1969	154
Genus <i>Nephrops</i> Leach, 1815	155
Genus <i>Thaumastocheles</i> Wood-Mason, 1874	157
 BIBLIOGRAPHY	 159
 INDEX	 165

I

PRINCIPAL MORPHOLOGICAL FEATURES OF DECAPOD CRUSTACEANS (CRUSTACEA, DECAPODA)

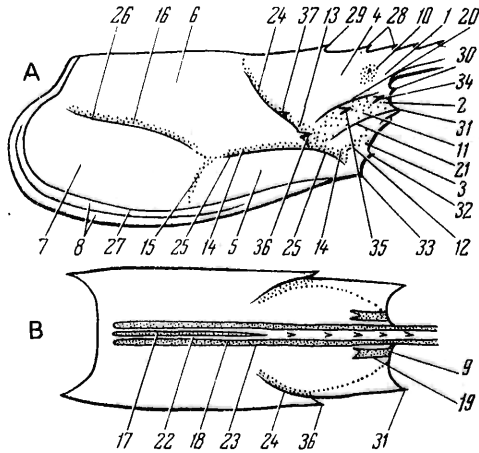
Decapods are higher forms of crustaceans in which one of the most important characters is constancy in number of body segments. The body consists of three sections: head, thorax, and abdomen. In most species the segments of the head and thorax are fused. Only in some fresh-water crayfish and most hermit crabs is the last thoracic somite movable. In some shrimps (for example, *Penaeus*) the anterior part of the head (with the eyes and antennules) is separated from the remaining portion by a joint. The entire body of a decapod consists of 21 segments, the head, thorax, and abdomen comprising 6, 8, and 7 segments respectively.

Through the fusion of the head and thoracic sections the cephalothorax is formed, which is covered laterally and dorsally with a common covering, the carapace.

Carapace. Exoskeletal cover which extends dorsally over the fused segments of the cephalothorax. True, in some cases (*Typton*, *Porcellana*, Paguridae, *Homola*, *Dromia*, etc.) the carapace and the penultimate segment* of the thorax are separated. The lateral parts of the carapace cover the branchial regions and are called the branchiostegites. The structure of the carapace is highly variable and distinctive in different groups of decapods and hence an important taxonomic character. In shrimps it is usually elongated, laterally compressed, and posteriorly rounded, merging into the lateral surfaces with no pronounced curve. The same is true of spiny lobsters, lobsters, crayfishes and some snub-tailed crustaceans. In other groups of Reptantia the carapace is more often dorsoventrally flat, short, and more or less elongated in the direction of the transverse axis of the body. Its contours are extremely variable. The dorsal surface is separated from the lateral surfaces by a distinct margin which is sometimes denticulate. The lateral and dorsal

* Mistake in original. Should read "last segment"—General Editor.

surfaces are divided into a number of regions by grooves. The cervical groove (the place of attachment of the gastric muscles) (Figure 1) is a frequent feature and separates the gastric area of the carapace from the cardiac. The latter is separated from the branchial areas by the branchial grooves. In addition to these more prominent grooves, other grooves, carinae, teeth, and spines occur on the carapace, the presence or absence of which is of taxonomic significance. The branchiostegites are never fused with the thoracic coverings, which are divided into segments (somites); they are fused on the anterior side with the supraoral plate only in true crabs. The true crab differs from other crab-like crustaceans in this character, whereby the anterior margin of the branchial cover hangs freely from the base of the antennae, forming a broad slit for the water passing out of the branchial cavity. In true crabs a more or less broad fusion occurs between the supraoral plate, the branchial cover, the base of the antennae, and the branchial opening.



4 Figure 1. Diagrammatic sketch of carapace of macruran crustaceans (shrimp, spiny lobster, lobster) (from Kubo, 1949).

A—lateral view; *B*—dorsal view; Sections of carapace: 1—frontal (forehead); 2—orbital; 3—antennal; 4—gastric; 5—pterygostomian; 6—cardiac; 7—branchial gill cover or branchiostegite; 8—marginal; Grooves: 9—gastrofrontal; 10—postocular; 11—orbito-antennal; 12—antennal; 13—cervical; 14—hepatic; 15—inferior; 16—branchiocardiac; 17—median; 18—adrostral; Carinae: 19—gastrofrontal; 20—gastroorbital; 21—antennal; 22—postrostral; 23—adrostral; 24—cervical; 25—hepatic; 26—branchiocardiac; 27—pterygostomian; Spines: 28—postrostral; 29—epigastric; 30—supraorbital; 31—antennal; 32—branchiostegal; 33—pterygostomial; 34—postorbital; 35—post-antennal; 36—hepatic; 37.*

* Shown in figure but omitted from legend—General Editor.

The anterior margin of the carapace between the orbits is called the forehead. In swimming forms it very frequently juts out forming a rostrum (Figure 2). Depending on the decapod's mode of life, the structure of the rostrum varies considerably, ranging from a short and simple spine or tip above the eyes to a knife- or saber-shaped structure.

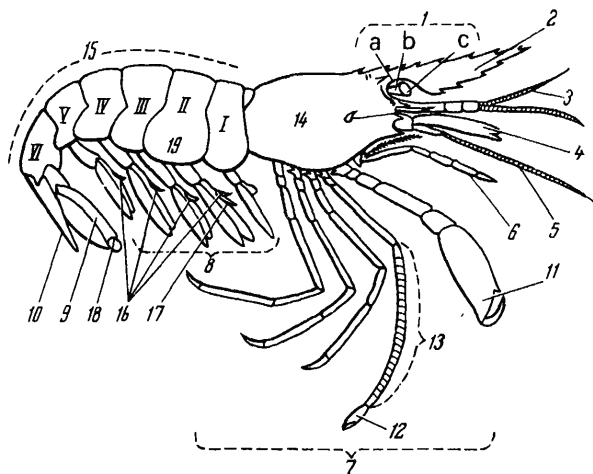


Figure 2. Diagrammatic sketch of macruran crustaceans (shrimp, spiny lobster, lobster) (lateral view) (from Holthuis, 1955).

1—eye (a—orbit; b—stalk; c—cornea); 2—rostrum; 3—antennule; 4—scaphocerite; 5—antennal flagellum; 6—maxilliped III; 7—walking legs (percopods); 8—swimming limbs (pleopods); 9—caudal limbs (uropods); 10—telson; 11—false chela; 12—true chela; 13—carpus divided into secondary segments; 14—carapace; 15—abdomen; 16—appendix interna; 17—appendix masculina; 18—dieresis; 19—pleuron of abdominal somite (epimeron).

In some cases it articulates with the carapace (shrimps of genera *Pantomus* and *Rhynchocinetus*). On the upper and lower sides, sometimes only on the upper side, the rostrum is armed with movable and fixed teeth. The armature of the rostrum is important in taxonomy and for the sake of the number of teeth on the rostrum is expressed by the following formula (Vinogradov, 1950):

$$a - b + \frac{c - d}{e - f} g - h$$

where a = minimum number of teeth on middle crest of carapace (epigastric teeth);

b = maximum number of epigastric teeth;

c = minimum number of teeth on upper margin of rostrum (rostral teeth);

- d = maximum number of upper rostral teeth;
 e = minimum number of lower rostral teeth;
 f = maximum number of lower rostral teeth;
 g = minimum number of teeth at end of rostrum (terminal teeth of rostrum);
 h = maximum number of terminal teeth.

A large number of appendages are attached to the lower side of the cephalothorax. The scutella of the carapace, known as the sterna, are located between them. In most shrimp these are poorly developed because of the fact that the bases of the appendages are very close to each other. In spiny lobster and lobster the shape of the sterna often constitutes an important taxonomic character (*Scyllaridae*, *Enoplometopus*, *Homaridae*).

Abdomen. Located behind the cephalothorax. Usually consists of seven abdominal somites (the last one called the telson). The abdomen is well developed in shrimp and highly compressed laterally. The somites of the abdomen articulate freely with each other. Laterally, the margins of the somites hang down freely, forming the pleura (epimera). The abdominal sternal surface is not as well developed as the lateral margins.

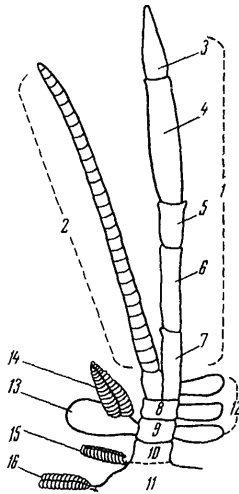


Figure 3. Diagrammatic sketch of a typical appendage of a decapod crustacean (from Holthuis, 1955).

- 1—endopod; 2—exopod; 3—dactyl (finger);
 4—propodus; 5—carpus; 6—merus; 7—ischium;
 8—basis; 9—coxa; 10—precoxa; 11—body; 12—endites;
 13—cpipod; 14—podobranchia; 15—arthrobranchia;
 16—pleurobranchia.

There is a characteristic curve in Caridea between the third and fourth somites, and the epimeron of the second somite is better developed than the epimera of the other somites, overlapping the contiguous epimera anteriorly and posteriorly. This overlapping is especially pronounced in the female, sometimes forming a unique oval chamber as, for example, in *Sympasiphaea annectens*. In swimming forms the sixth somite is markedly elongated, being more than twice the length of the fifth. In other groups of decapods the epimera are reduced. In the hermit crab, for example, the abdomen is mostly devoid of appendages and is soft and often spiraled. A more complete reduction of the abdomen is found in members of Galatheidae in which it is tucked under the cephalothorax. This reduction is maximum in crabs. The pleura are totally absent here and the abdomen flat and tucked under the carapace; in the male it is located in a special groove. In the female the abdomen is two to three times broader and protects the abdominal processes involved in egg-laying. In the male some of the modified abdominal processes participate in copulation. The shape of these processes is highly variable. Some of the segments of the abdomen may be fused.

Limbs and other appendages. In decapods only one of the 21 segments of the body—the telson—lacks appendages. Hence a total of 20 pairs of jointed appendages are present, one pair on each segment. Each appendage is initially biramous (Figure 3). The inner ramus of the appendage or endopod carries the major functional load. The outer ramus or exopod is often subject to reduction. The endopod of a typical appendage consists of seven segments labeled (beginning from the distal 7 end): dactyl (finger), propodus (the dactyl and propodus together may form a true or false chela), carpus, merus, ischium, basis (the exopod is attached to the basis), and coxa. The coxa is attached to a small outgrowth on the body, the precoxa. The coxa often has a folded lobe—the epipod (of mastigobranchia) to which the gill—the podobranchia—is attached. One or two gills also occur on the joint between the coxa and the body and are called arthrobranchiae. Finally, one or two pairs of gills are located on the lateral surface of the body and known as pleurobranchiae. Several modifications of a typical appendage are known, which relate to the different functions of the appendages of the different segments of the body. In some species some appendages are entirely or partly reduced. This is especially true of the exopods, particularly those of the walking legs.

Eyes. The stalked eyes of decapod crustaceans are located on the first segment of the body and included in the total number of body appendages. They usually consist of two segments: a basal segment and a terminal one carrying the cornea. The size ratio between these two segments may vary considerably. In most cases the terminal segment is

larger, although the contrary is also known (*Podophthalmus*, Brachyura, Portunidae). The cornea is faceted and usually terminally located. It may be black, deep brown, or reddish brown in color. In deep-sea decapods it is reduced to a varying degree and in cavernous decapods almost totally absent.

Antennules. Located on the second segment of the body. In shrimp they are placed right below the eyes. Because of the fact that in crab the eyes are shifted toward the sides, the antennules appear to be located between them, almost along the median line of the body. Each antennule consists of a three-segmented peduncle and two or three (*Palaemonidae* and some members of *Hippolytidae*) flagella, which are attached to the last segment of the peduncle. In shrimp the antennular peduncles are freely attached to the body and highly variable in size. In crab with highly reduced antennules the basal segments are contiguous with the margins of the forehead or mouth and thus lose their mobility. The antennular flagella vary considerably in size but are usually shorter than the antennae (see below); in some deep-sea shrimp they may be several times longer than the body.

The proximal part of the basal segment is often flat in shrimp, forming a socket for the eye. The expansion on the outer side of the basal segment is called the stylocerite. The structure at the base of the basal segment of the antennular peduncle is called a statocyst (balancing organ). In some shrimps of family *Penaeidae* yet another structure occurs on the inner side of this segment. Lanceolate in shape it is known as the prosarthema and its presence or absence is an important taxonomic character.

Exceptionally, in shrimp of the genus *Solenocera* (*Penaeidae*) and in lower crabs of the genus *Albunea* (*Hippidea*) the antennular flagella may fuse to form a siphon-tube, which is used for respiration. In male shrimp of family *Sergestidae* the flagella are modified into an organ for holding the female.

Antennae. Located next to the antennules, the antennae consist of a five-segmented peduncle comprising a two-segmented (second segment called the basicerite) and a three-segmented endopod. The last segment of the endopod (carpocerite) carries a long flagellum. The excretory organ (antennal gland) opens at the back of the first segment of the protopodite. In addition to the endopod, the second segment also has an exopod known as the scaphocerite. This scale-like structure is highly developed in shrimp; together with the rostrum, the scaphocerites constitute a stabilizer—analogue to the tail stabilizer of an airplane. This device is used for maintaining the direction of movement in such situations as backing away from predators. In the case of spiny lobsters, lobsters, hermit crabs, and crabs the scaphocerite has undergone reduction and gradually disappeared in the same way as the rostrum. This change took place in higher crustaceans as a result of a transition from

swimming to crawling as a means of locomotion. The antennal flagella in shrimp are usually very long, sometimes even several times longer than the body. In crab they are reduced, short, or may be totally absent.

The modifications of the antennae in the spiny lobsters of family Scyllaridae are rather interesting. The basal segment of the antenna is fused with the margin of the forehead; of the remaining three movable segments the first and third are very small and the second very broad, dorsoventrally flat, and more or less highly serrate along the outer margin. This segment, together with the terminal one, which is also modified in the same way, forms a unique scapula (squama).

Mandibles. The first pair of oral appendages, the mandibles, are considerably modified and specialized appendages. In the identification of decapods their analysis is mandatory even though they lie much deeper in the body than do the other oral appendages. To remove the mandibles properly, the other oral appendages should either be pushed aside or carefully removed first. The body of the mandible consists of a divided apparatus and the base to which the muscles are attached. The divided apparatus consists of two highly calcified processes—the molar and incisor—located approximately at right angles to each other. In most decapods (Penaeidea, Stenopodidea, and all Reptantia), as well as in primitive types of Eucyphidea (Pasiphaeidae, Stylodactylidae, Oplophoridae), the molar and incisor are separated from each other only by a groove. In other members of Eucyphidea these processes are in sharp apposition to each other. In some families the incisorial process has disappeared completely and only the molar remains.

Moreover, the mandibles usually have a palpus (synnaphipod), which primarily consists of three segments. However, the first or second segment of the palpus is frequently reduced and sometimes the entire palpus absent. These features constitute important taxonomic characters. In origin, the mandibles are possibly homologous to the coxae of other appendages or to their several segments. The origin of the palpus is controversial; some researchers hold that it is not homologous to the exopod but rather a new structure.

The mandibles are situated between the upper and lower labia. The palpus, in most cases, is attached to the upper labium. In those forms which have both processes, the incisorial is attached to the upper labium and the molar directed toward the oral opening. The mandibles are the major grinding organs of the oral apparatus and act as the opening and closing forceps. The other oral appendages are located behind the lower labium and cover the mandibles like a fold. The two pairs of maxillae belong to this group.

Maxilla I (or maxillula). This is a bilobate structure in which the lower lobe is slightly weaker than the upper. The upper or stronger lobe is covered with a series of large spines or teeth which, like the mandibular

teeth, help to grind food. The two lobes may articulate with each other. The palpus of maxilla I is most often single-, rarely double- (*Homarus*, *Thalassinidea*, some crabs), and very rarely three- or four-segmented (*Penaeus*). The lobes of maxilla I are also known as endites or laciniae.

Maxilla II. Much larger than maxilla I, also bilobate, but here each lobe may be further divided into two. The palpus is usually single-segmented (in *Nephrops*, double-segmented) and the exopod prominent (also known as the scaphognathite or respiratory lamella). The vibrating movements of the lamella cause water to pass through the gills. Its removal causes death by asphyxiation.

9 The first three pairs of the thoracic limbs are known as maxillipeds.

Maxilliped I. In structure, resembles a maxilla. The coxa and basis are quite broad and look like lobes (the coxal lobe may be bifid) (for example, in *Penaeidae*). The palpus of the maxilliped (homologous to the exopod) has no more than five segments and usually only one. In crabs it is broad at the end and forms a transverse fold which serves as the closing end of the canal leading into the branchial chamber. The exopod usually consists of an expanded basal part and a terminal flagellum which is sometimes multisegmented. The expanded basal part, a characteristic feature of *Eucyphidea*, is otherwise known as the eucyphid appendage. In shrimp the endopod on maxilliped I is bilobate; in crab it is a very elongated structure with a broad proximal and a narrow distal part. In *Eryonidea* the exopod, and in *Oxystomata* the endopod, are modified into respiratory tubes.

Maxilliped II. In structure, resembles a pereopod due to the presence of a five-segmented endopod (the number of segments may be reduced due to the fusion of the basis with the ischium or the fusion of the ischium and merus). In higher members of *Eucyphidea* the dactyl of maxilliped II is situated not at the end of the propodus, but on its broad lateral side. A segmented or unsegmented exopod is commonly present in maxilliped II. In some groups of decapods, however, the exopod may be totally reduced. An epipod and gill (podobranchia) may also be present.

Maxilliped III. Usually consists of the same elements described for maxilliped II: In shrimp it is long and resembles a pereopod. In many cases (for example, *Eucyphidea*) the individual segments have fused (for example, the ischium and merus, or the propodus and dactyl, or the basis and ischiomerus), thereby reducing the number of segments. The ischium in *Astacura*, *Palinura*, *Galatheidea* and other primitive *Reptantia* is armed with a series of teeth used in crushing. In the primitive hermit crab the propodus and dactylus form a small chela. In higher crabs the ischium and merus of maxilliped III are expanded and form an opercular cover for the oral opening. The last three segments of the appendage

are reduced in this process into a palpus, which is often hidden behind the merus.

As in maxilliped II the exopod in maxilliped III is highly variable. It is more frequently joined with the coxa than with the basis. Sometimes (in *Sergestidae*, *Eryonidea*, etc.) it may be totally absent. In crabs of family *Leucosiidae* (*Oxystomata*) it is broad and forms an operculum for the branchial canal. The epipod, on which a podobranchia is often present, is well developed in crabs.

The oral appendages serve the following functions: grinding of food, passage of fresh water into the gills (scaphognathite), and cleansing of the eyes and antennules (especially the last segment of maxilliped III).

Behind the oral appendages five pairs of pereopods (walking legs) are found—the very feature for which the order Decapoda was established.

Pereopods. In structure, resemble the typical seven-segmented appendage of shrimp. In Reptantia some of the segments or podomeres have fused. In *Astacura* only the basis and ischium of the chelipeds are fused. In other members of Reptantia (except *Eryonidea*) the same is true of all the pereopods. Hence these limbs generally appear to be six-segmented. The site of the rupturing which occurred during the autotomy (shedding) of the appendages is evident in the center of these segments. The main bend in the pereopod (knee) occurs in the joint between the merus and carpus. Exopods are present on the pereopods of only some decapods, primarily pelagic shrimp (*Oplophoridae*, *Pasihaeidae*, some members of *Atyidae*, etc.). They are usually rudimentary (for example, in *Penaeidea*) or present only in the larvae (mysid stage of *Natantia*, *Astacura*, etc.).

10 The epipods (or mastigobranchiae) are located on the coxae and directed backward. They consist of a narrow proximal part (pedicel) and a distal widened and often bifid lamella. The gills are cleansed with their help. They may be present on all the appendages from maxilliped I to pereopod IV (sometimes V). They are particularly well developed in shrimp and *Anomura*, but in crab (except for lower *Dromiacea*) are present only on the maxillipeds.

Since pereopods differ somewhat in function, certain differences are naturally evident in their structure. The first two or three pairs participate in catching prey or in self-defense against predators. Large chelae of variable size are usually present on the first and rarely on the second pereopods (in *Penaeidea*, *Stenopodidea*, and *Astacura* chelae are present on the first three pairs of pereopods). Depending on their structure these chelae are either true or false (see Figure 2) and exhibit a number of modifications. Even within one species the anterior chelae may differ from the posterior, or those on the right legs differ from those on the left.

Generally speaking, the last two or three pairs of pereopods are

locomotory and serve no other function than the animal's movement over ground. In shrimp and lower Reptantia (*Palinura*, *Astacura*) these pereopods are very similar in structure. True, in female spiny lobsters small false chelae are evident on the fifth pair of pereopods. In some decapods the last pair of pereopods is reduced (the reduction varying, for example, in pelagic shrimp such as *Pasiphaeidae*, etc. and hermit crabs) or specialized to perform other functions (for example, the swimming legs of crabs of family *Portunidae*).

The abdomen has six pairs of appendages; the first five pairs are known as pleopods.

Pleopods (in shrimp). Usually used for swimming by both sexes. They have a typical biramous structure and consist of a very short coxa and a fairly long basis; exo- and endopods are also present. The latter are flagellar or lamellar in structure. A small appendix armed with hooks is usually found on the endopod (appendix interna or stylamblys—in *Eucyphidea*, *Palinura*, and *Axiidae*); it is absent in *Penaeidea* and *Astacura*. These appendices link the pleopods of both sides of the body during movement.

In all decapods one or more pairs of pleopods serve as copulatory organs or are adapted for egg-laying. In *Penaeidea* the endopods of the first pair of pleopods of the male are modified in the form of *petasma* (see below) which are generally symmetrical but sometimes (*Metapenaeopsis*) asymmetrical. In the male of *Eucyphidea*, in addition to the appendix interna, another appendix—appendix masculina—occurs on the second pleopods. In *Stenopodidea* and *Scyllaridea* appendages with sexual modifications are absent in the male. In *Eryonidae*, the first pair, and in *Nephropidae* and *Potamobiidae*, the first two pairs are modified into copulatory organs in the male. A somewhat similar feature is also observed in several members of *Anomura*. In primitive forms of *Paguridae* the first two pairs of pleopods in the male and sometimes the first pair in the female are modified, while the others on both sides of the body remain typical. In higher hermit crabs appendages with special sexual modifications and the pleopods adjoining the columella (the central column) are absent on the right side of the body; both are present on the left side, however (in *Paguroopsis* the reverse has been observed). In crabs, pleopods I and II in the male are modified into unique rod-like structures; the other pleopods are totally absent. In the female, except for the first pair, as in other decapods (except *Penaeidea*), they are adapted for egg-laying.

Uropods. Appendages of the sixth abdominal somite (pleopods VI). In all shrimp and primitive Reptantia these appendages together with the telson form the tail fan. A protopodite with foliate outer and inner rami characterizes most uropods. In *Scyllaridea* only the proximal half

of the rami is hard and calcified, while the distal part is leathery and elastic. In *Astacura* the exopod is divided into two parts by a transverse suture (dieresis). In typical hermit crabs the uropods are reduced; their outer surfaces are extremely rough and used for attachment of the body to the shell. Uropods are totally absent in *Lithodidae* and *Brachyura* and rudimentary in *Dromiidae*.

Gills. Contained in a branchial chamber in decapods and externally covered by the branchiostegite. Considered lateral cuticular outgrowths they differ in structure and have been divided into three types: (1) phyllobranchiae consisting of a stalk with two series of flat foliate structures; (2) trichobranchiae consisting of a stalk with numerous long and thin tubules; and (3) dendrobranchiae consisting of a stalk on which the tubules are arranged in two rows but are so densely branched that they appear dendroid (Figure 4). Phyllobranchiae are typical of *Eucyphidea*, most *Paguridea* and *Galatheidea*, all *Hippidea*, and the majority of *Brachyura*. Trichobranchiae are typical of *Eryonidea*, *Scyllaridea*, *Astacura*, *Stenopodidea*, *Thalassinidea*, lower *Paguridea*, *Galatheidea*, and *Dromiacea*. Dendrobranchiae are found only in *Penaeidea*.

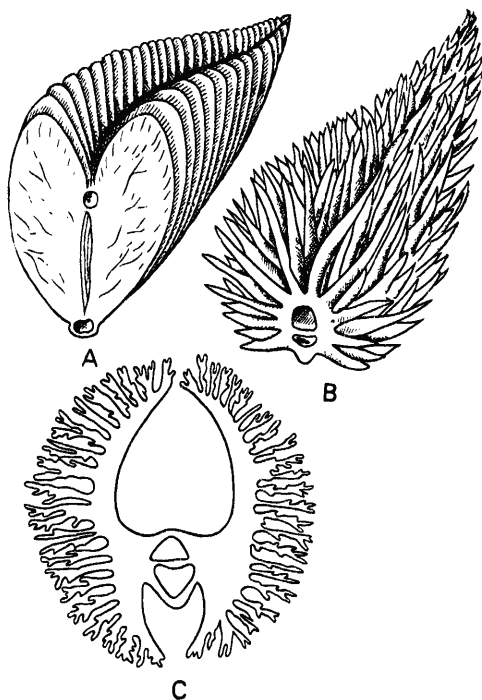


Figure 4. Types of gills found in decapod crustaceans.

A—phyllobranchia (general view); B—trichobranchia (general view) (from Vinogradov, 1950); C—dendrobranchia (cross section) (from Balss, 1926)

The podobranchiae are located on the coxae of the maxillipeds and pleopods*; the arthrobranchiae are attached to the segment between the body and the coxa; the pleurobranchiae are located on the lateral wall of the body. A segment may have one podobranchia, two arthrobranchiae, and one pleurobranchia. However, this arrangement is found only in some of the pereopodal somites in some shrimp; in other shrimp the number of gills may be more or less or even absent on individual somites. For example, pleurobranchiae are absent on maxillipeds I, while podobranchiae and arthrobranchiae are generally absent on pereopods V. The gills and epipods constitute an important taxonomic character which has been expressed in a branchial formula (see Table).

Stridulatory organ. Present in many members of Decapoda. The presence of this organ as well as the peculiarities of its structure are taxonomically important features. In some spiny lobsters of the family Palinuridae the stridulatory organ is situated between the place of attachment of the antennae and the antennules. Unique sounds are produced when these two parts rub against each other. On the basis of this organ all the spiny lobsters of the family have been classified as Silentia (silent) and Stridentia (shrilling).

Branchial formula for some decapods

	Maxillipeds			Pereopods				
	I	II	III	I	II	III	IV	V
<i>Benthescymus</i>	Ep 1A	Ep, 1Po 1A, 1Ple	Ep, 1Po 2A, 1Ple	Ep, 1Po 2A, 1Ple	Ep, 1Po 2A, 1Ple	Ep, 1Po 2A, 1Ple	Ep 2A, 1Ple	— 1Ple
<i>Pasiphaea</i>				1A, 1Ple	1A, 1Ple	1A, 1Ple	1Ple	1Ple
<i>Eupagurus</i>			2A	2A	2A	2A	2A, 1Ple	
<i>Cancer</i>	Ep	Ep, 1Po 2A	Ep, 1Po 2A	2A	1Ple	1Ple		

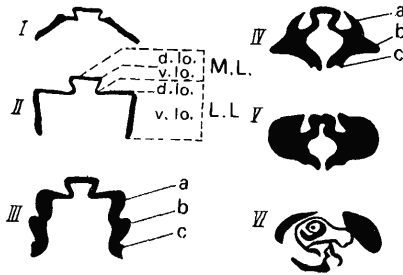
Key: Ep—epipod; Po—podobranchia; A—arthrobranchia; Ple—pleurobranchia.

The stridulatory organ is present in a number of crabs and, for the most part, is quite similar in structure and seldom single. A small ridge occurs on the ischium of each cheliped which the crab seesaws against a group of tubercles or a group of small ridges located either on the inner side of the palm of the chela of the same cheliped or on the lower side of the body. In shrimp of the genus *Metapenaeopsis* the sound-producing mechanism is located on the posterior half of the branchiostegite. The shape and arrangement of the ridges in the stridulatory organ of this genus are of considerable importance in species identifications (see Figure 35).

* Mistake in original. Should read "pereopods"—Technical Editor.

Copulatory organs of Penaeidea. In shrimp belonging to Penaeidea the copulatory organs—the petasma and thelycum—are so significant in species identification that they merit special attention (Kubo, 1949).

Petasma. Formed by the fusion of the endopods of pleopods I along their inner margin. As can be seen from Figure 5, the petasmal endopod consists of a median or inner lobe (*M.L.*) and a lateral lobe (*L.L.*). Each lobe is divided by a fold into two parts: a dorsal or anterior (*d.lo.*) and a ventral or posterior (*v.lo.*) lobule respectively. The ventral lobule of the lateral lobe has three longitudinal ridges on its outer side: *a*, *b*, and *c*. Ridge *a* is located near the boundary between the dorsal and ventral lobules; ridge *b* near the middle line of the outer surface of the ventral lobule; and ridge *c*, usually smaller than the other two, on the outer surface near the ventral margin of the lobule.



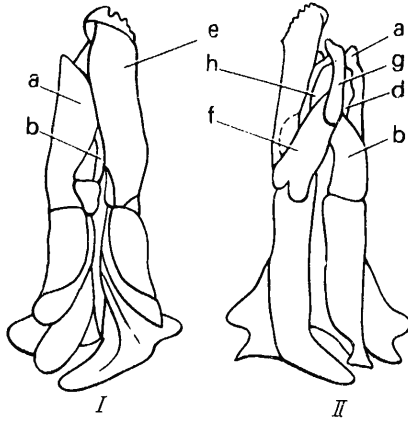
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Figure 5. Main structural features of different types of petasma.

I to *V*—Cross sections at about midpoint level of petasma of adult specimens. Gradual complexities in petasma depicted (from Kubo, 1949); *M.L.*—median lobe; *L.L.*—lateral lobe; *d.lo.*—dorsal lobule; *v.lo.*—ventral lobule; *a*, *b*, and *c*—dorsal, median, and ventral ridges respectively of ventral lobule of lateral lobe; *I*—*Aristaeus*, *Aristeomorpha*, *Penaeopsis*; *II*—*Penaeus*, *Solenocera*, *Hymenopenaeus*; *III*—*Parapenaeus*, *Trachypenaeus*; *IV*—*Metapenaeus*, *Parapenaeopsis*, *Eusicyonia*; *V*—*Metapenaeopsis* (section through middle of petasma); *VI*—*Metapenaeopsis* (section through distal part of petasma, about middle of inner intermediate plane).

In addition to this lobular division, the petasma is characterized by a series of projections or spines peculiar to different genera or species of Penaeidae. The symmetrical structure of the petasma in most shrimp makes it easy to locate these unique ornamentations and use them in species identification. In shrimp of the genus *Metapenaeopsis*, however, the petasma has lost its typical structure and become highly asymmetrical. To facilitate the identification of shrimp belonging to this genus therefore, the petasmal structure has been detailed in Figure 6.

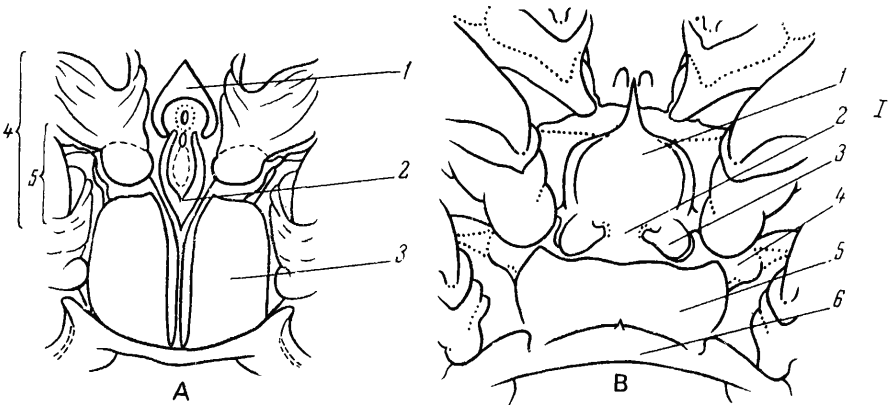
In shrimp of the genus *Metapenaeopsis* both the petasmal endopods are divided transversely into approximately equal proximal and distal parts.



13 Figure 6. Diagrammatic sketch of petasma in shrimp of the genus *Metapenaeopsis* (Raccek and Dall, 1965).

I—ventral view; *II*—dorsal view; *a*—right distoventral projection; *b*—right distodorsal lobule; *c*—distoventral flap; *d*—distomedian lobule; *e*—left distoventral projection; *f*—left distodorsal lobule; *g*—inner intermediate strip; *h*—outer intermediate strip.

The distal part of the right endopod consists of four elements: (*a*) right distoventral projection, (*b*) right distodorsal lobule, (*c*) distoventral flap, and (*d*) distomedian lobule. The right distoventral projection lies on the distoventral margin of the proximal part. The right distodorsal lobule arises from the distodorsal margin of the proximal part. The distoventral flap is situated on the ventromedian margin of the proximal part of the



13 Figure 7. Diagrammatic sketch of the thelycum. *A*—closed type (Perez Farfante, 1969): 1—anterior process; 2—middle ridge; 3—lateral plate (flap); 4—posterior process; 5—middle projection; *B*—open type (Perez Farfante, 1971): 1—median plate; 1—anterior part; 2—middle bridge; 3—knob; 4—projection; 5—transverse plate; 6—posterior crest.

endopod, and is partially covered by the distoventral projection and distodorsal lobule.

The distomedian lobule is situated on the basal lateral margin of the distoventral flap and is masked by the right distoventral projection.

The distal part of the left petasml endopod also consists of four elements: (*e*) left distoventral projection, (*f*) left distodorsal lobule, (*g*) inner intermediate strip, and (*h*) outer intermediate strip. The distoventral projection is located on the distoventral margin of the proximal part and the distodorsal lobe on the distodorsal margin. The inner and outer intermediate strips are small appendages situated on the distal inner and outer margins of the distodorsal lobule.

Thelycum. Located on the thoracic sterna between pereopods IV and V. It consists of a series of outgrowths, depressions or grooves, plates and flaps. It is meant for the attachment of spermatophores.

Two types of thelycums have been distinguished: the open type (majority of the members of Penaeidae) and the closed type (in most of the shrimps of the genus *Penaeus*). The latter consists of two lateral plates and a median projection (Figure 7).

II

TAXONOMY OF ORDER DECAPODA LATREILLE

KEY TO SUBORDERS (FROM BALSS, 1957)

- 15 1. Carpo-propodal articulation of pereopods only at one fixed point. Pleopods well developed, modified for swimming Suborder **NATANTIA**.
— Carpo-propodal articulation of pereopods at two opposite points. Pleopods, if present, highly reduced and not modified for swimming Suborder **REPTANTIA**.

SUBORDER NATANTIA BOAS, 1880

KEY TO TRIBES (FROM BALSS, 1957)

1. Pereopods III chelate. Pleura of first abdominal segment not overlapped by those of second segment. Abdomen without a sharp curve 2.
— Pereopods III never chelate. Pleura of second abdominal segment noticeably overlap those of first segment. Abdomen usually sharply curved Tribe **Caridea** (Eucyphidea).
2. Pereopods III not stouter than II and I. Males with petasma Tribe **Penaeidea**.
— Pereopods III (either on both or on one side only) much more robust than II and I. Males without petasma ... Tribe **Stenopodidea**.

Tribe **Penaeidea** de Haan, 1849

KEY TO FAMILIES

1. Pereopods IV and V well developed. Gills numerous Family **Penaeidae**.
— Pereopods IV and V reduced or absent. Gills few (up to 8) or absent Family **Sergestidae**.

FAMILY PENAEIDAE DANA,

KEY TO SUBFAMILIES (FROM ANDERSON AND LINDNER, 1945)

1. Prosartheta present2.
- Prosartheta absent3.
2. Postorbital spine absent. Cervical groove shortSubfamily **Penaeinae**.
- Postorbital spine present. Cervical groove long, either reaching or almost reaching dorsal side of carapaceSubfamily **Solenocerinae**.
3. Carapace without median dentate crest extending to posterior margin.*4.
- Carapace with median dentate crest extending dorsally to posterior marginSubfamily **Sicyoninae**.
4. Upper antennular flagellum very short, several times shorter than lower oneSubfamily **Aristeinae**.
- Upper antennular flagellum almost as long as lower oneSubfamily **Benthescyminae**.

16

FAMILY SERGESTIDAE DANA, 1852

KEY TO SUBFAMILIES

1. Carapace moderately compressed laterally. Lower antennular flagellum and gills presentSubfamily **Sergestinae**.
- Carapace highly compressed laterally. Lower antennular flagellum and gills absentSubfamily **Leuciferinae**.

Subfamily PENAEINAE Dana, 1852

KEY TO GENERA (FROM DALL, 1957, WITH EMENDATIONS AND ADDITIONS)

1. Pleurobranchia on last thoracic somite and epipod on maxilliped III present. Ventral rostral teeth usually present2.
- Pleurobranchia on last thoracic somite and epipod on maxilliped III absent. Ventral rostral teeth absent3.
2. Incisorial process of mandible short, almost rectangular. Body smooth. Pterygostomian angle obtuse. Telson without spines or with three pairs of movable spines*Penaeus* Fabricius.
- Incisorial process of mandible elongated and saber-shaped. Body densely pubescent. Telson with three pairs of immovable spines ...
.....*Funchalia* Johnson.

*Error in original. Should read "Carapace with dentate crest extending only to its center"—Technical Editor.

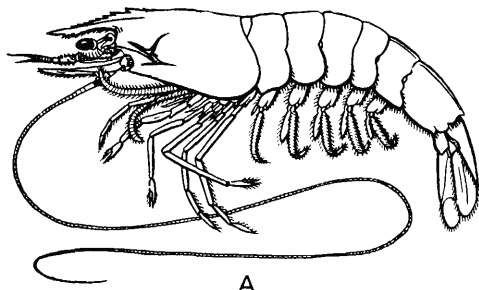
3. Petasma symmetrical. Maxilliped III usually without basal spine4.
- Petasma asymmetrical. Maxilliped III with basal spine.
.....*Metapenaeopsis* Bouvier.
4. Telson with pair of large immovable subapical spines. First segment of antennular peduncle with spine (sometimes very small) on ventral distomedian margin5.
- Telson without pair of large immovable subapical spines, but often with lateral immovable spines (except in *Parapenaeopsis stylifera* Milne-Edwards). First segment of antennular peduncle without spine on ventral distomedian margin8.
5. Telson with less than four pairs of immovable spines. Basis and ischium of pereopod I with one spine each6.
- Telson with four pairs of immovable spines. Basis and ischium of pereopod I without spines*Artemesia* Bate
(one species: *A. longinaria* Bate, 1888).
6. Carapace with longitudinal sutures*Parapenaeus* Smith.
- Carapace without longitudinal sutures7.
7. Branchiostegal spine present. Petasma with pair of large spiny distolateral projections*Penaeopsis* Bate.
- Branchiostegal spine absent. Petasma with pair of tubular distolateral projections*Trachypenaeopsis* Burkenroad.
8. Exopods present on pereopods II to IV9.
- Exopods absent on pereopods II to IV*Macropetasma* Stebbing
(one species: *M. africanum* Stebbing, 1914).
9. Pleurobranchia present on thoracic somite VII. Exopod absent on pereopod V.*Metapenaeus* Wood-Mason and Alcock.
- Pleurobranchia absent on thoracic somite VII. Exopod present on pereopod V.10.
10. Maxilliped II with well-developed exopod. Chela typical in structure11.
- Maxilliped II without exopod. Chela with short finger and elongated palm*Protrachypene* Burkenroad
(one species: *P. precipua* Burkenroad, 1934).
11. Dactyl of pereopods IV and V typical in structure, not divided into secondary segments. Usually not more than distal half of rostrum edentate12.
- Dactyl of pereopods IV and V markedly elongated, filiform, and divided into secondary segments. Distal two-thirds of rostrum edentate*Xiphopenaeus* Smith.
12. Carapace with longitudinal sutures. Thelycum with broadly concave anterior plate, rounded anterior margin, and a transverse posterior plate. Ischium of pereopod II without spine13.
- Carapace without longitudinal sutures. Thelycum with narrow

- plate, partly bordered by two narrow posterolateral elevations. Ischial spine present on pereopod II *Atypopenaeus* (Alcock).
13. Epipod present on pereopod III 14.
— Epipod absent on pereopod III. *Parapenaopsis* (Alcock).
14. Rostrum long and slender, reaching far beyond distal margin of scaphocerite. Antennular flagella unequal in length and longer than carapace. Pereopods IV and V slender, much longer than the rest. Exopod of pereopod V extremely reduced
. *Tanypenaeus* Perez Farfante
(one species: *T. caribeus* Perez Farfante, 1972).
- Rostrum short, in length approximately equal to that of scaphocerite. Antennular flagella almost equal in length and shorter than carapace. Only pereopod V slightly longer than the rest. Exopod of pereopod V slightly smaller than those of the rest
. *Trachypenaeus* (Alcock).

Genus *Penaeus* Fabricius, 1798

KEY TO SPECIES

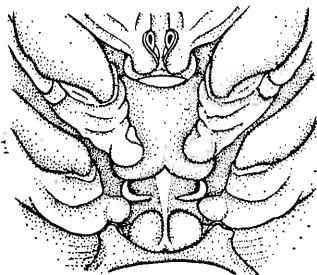
1. Adrostral grooves reach epigastric tooth or extend slightly beyond it. Gastrofrontal grooves absent 2.
— Adrostral grooves almost reach posterior margin of carapace. Gastrofrontal grooves present 13.
2. Subhepatic crest well developed. Thelycum in female, open type. Shrimps inhabit Pacific and Atlantic coasts of North, Central, and South America 3.
— Subhepatic crest poorly developed or absent. Thelycum in female, closed type. Shrimps inhabit coasts of Australia, Asia, and East Africa (as well as eastern part of Mediterranean Sea). 7.
3. Shrimps inhabit Atlantic coast of North, Central, and South America 4.
— Shrimps inhabit Pacific coast of North, Central, and South America 5.
4. Petasma with diagonal crest on inner surface of distal part of lateral lobe; distal ventromedian angle rounded. Thelycum with anterolateral crests facing each other. Pair of fleshy projections on sterna of pereopod (Figure 8) *P. setiferus* (L.), 1761.
— Petasma without diagonal crest on inner surface of distal part of lateral lobe; distal ventromedian angle almost forms a right-angle projection. Thelycum with almost parallel anterolateral crests, sometimes not bent toward each other. Pair of rounded hard outgrowths on sterna of pereopod V (Figure 9).
. *P. schmitti* Burkenroad, 1934.



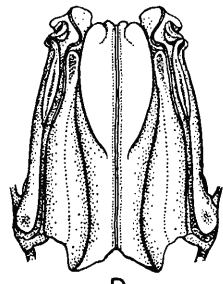
A



B



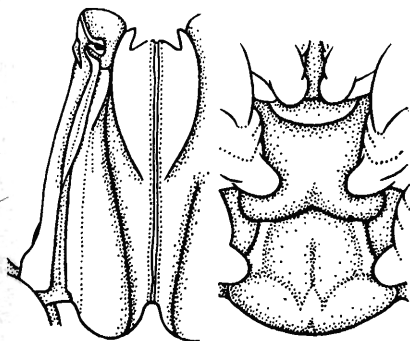
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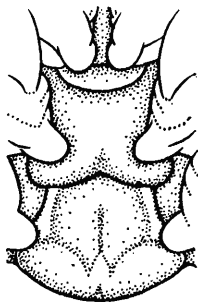
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Figure 8. *Penaeus setiferus* (L.)
(from Perez Farfante, 1969).

A—lateral view; B—cephalo-
thorax, dorsal view; C—thely-
cum, D—petasma.



A



B

Figure 9. *Penaeus schmitti*
Burkenroad.

A—petasma; B—thelycum.

- 5. Posterior ventral tooth of rostrum situated directly under or ahead of anterior or distal dorsal tooth. Adrostral carinae do not extend beyond epigastric spine. Rostral formula usually 9/2. Thelycum without dense pubescence. Sterna of pereopod V with two ventrally raised even areas in anterior part (Figure 10)
.....*P. vannamei* Boone, 1931.
- One or more ventral teeth of rostrum situated beyond distal dorsal tooth. Adrostral carinae extend beyond epigastric spine. Rostral formula usually 8-11/4-5. Thelycum without two ventrally raised areas on anterior part of sterna of pereopod V6.
- 6. Rostral formula usually 8/4-5. Antennular flagellum longer than peduncle. Male with widely spaced spines on middorsal surface of lower (inner) antennular flagellum. Female with distinctly raised triangular area in middle of sterna of pereopod V. Coxa of III, IV, and V pereopods in female with large outgrowths directed toward median line. Thelycum slightly pubescent (Figure 11)
..... *P. stylirostris* Stimpson, 1871.
- Rostral formula 10-11/3-5. Antennular flagellum either as long as or shorter than peduncle. Male with closely set spines on outer lateral margin of lower antennular flagellum. Female without triangular outgrowth in middle of sterna of pereopod V. Coxa of III, IV, and V pereopods without outgrowths. Thelycum often pubescent (Figure 12)*P. occidentalis* Streets, 1871.

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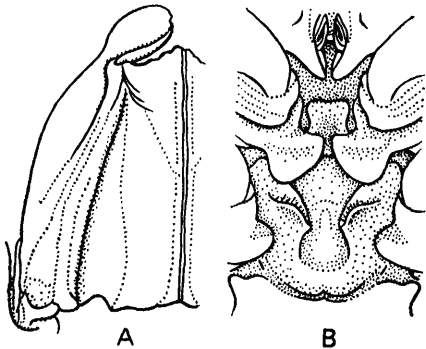


Figure 10. *Penaeus vannamei* Boone.
A—petasma; B—thelycum.

- 7. Carapace with well-defined subhepatic carina8.
- Carapace without subhepatic carina10.
- 8. Pereopod V without exopod (Figure 13)
.....*P. monodon* Fabricius, 1798.
- Pereopod V with a small but distinct exopod9.
- 9. Postrostral carina with a groove (Figure 14)
.....*P. semisulcatus* de Haan, 1844.

Figure 11. *Penaeus stylirostris*
Stimpson.

A—petasma; B—thelycum.

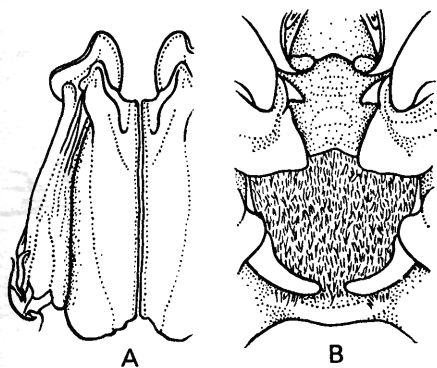
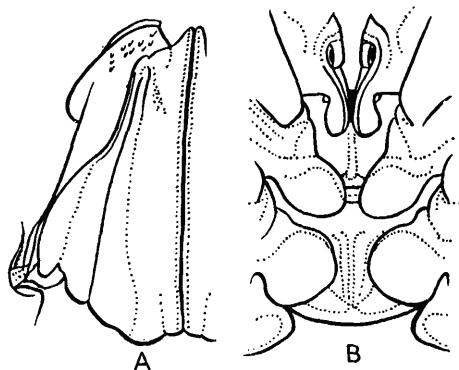
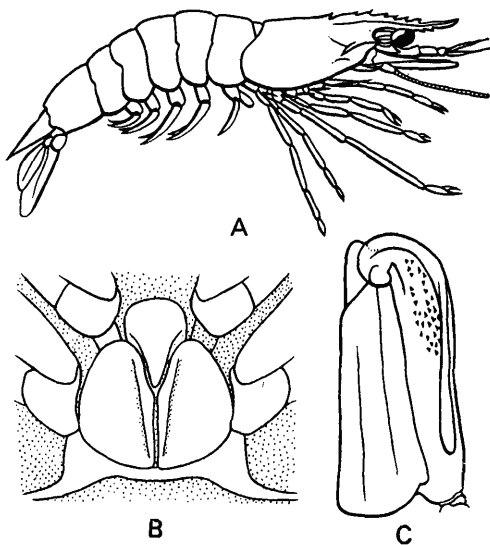


Figure 12. *Penaeus occidentalis* Streets
(from Perez Farfante, 1970).

A—petasma; B—thelycum.



20 Figure 13. *Penaeus monodon*
Fabricius (from Dall, 1957).

A—lateral view; B—thelycum;
C—petasma.

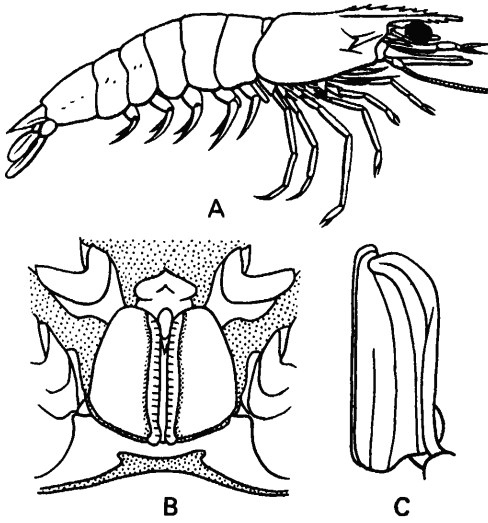


Figure 14. *Penaeus semisulcatus* de Haan (from Dall, 1957).

A—lateral view; B—thelycum; C—petasma.

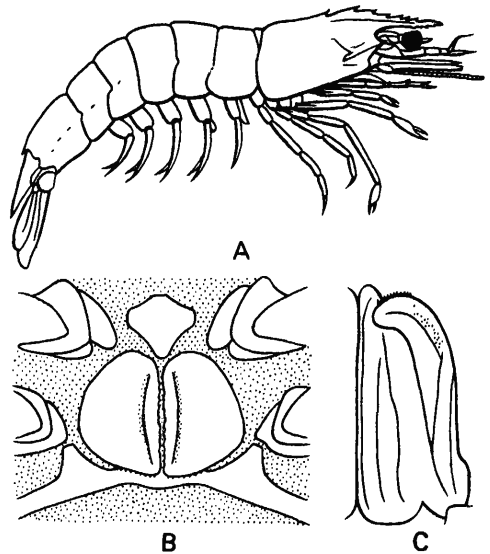


Figure 15. *Penaeus esculentus* Haswell (from Dall, 1957).

A—lateral view; B—thelycum; C—petasma.

- Postrostral carina without a groove (Figure 15)*P. esculentus* Haswell, 1879.
- 10. Pereopod III extends beyond distal margin of scaphocerite by at least one finger length11.
- Pereopod III does not extend up to distal margin of scaphocerite*P. orientalis* Kishinouye, 1896.
- 11. Gastroorbital carina occupies posterior two-thirds of distance be-

- tween hepatic spine and orbital angle. Rostral crest moderately high *P. indicus* Milne-Edwards, 1837.
- Gastroorbital carina absent or extends medially only up to one-third of distance between hepatic spine and orbital angle. Rostral crest high 12.

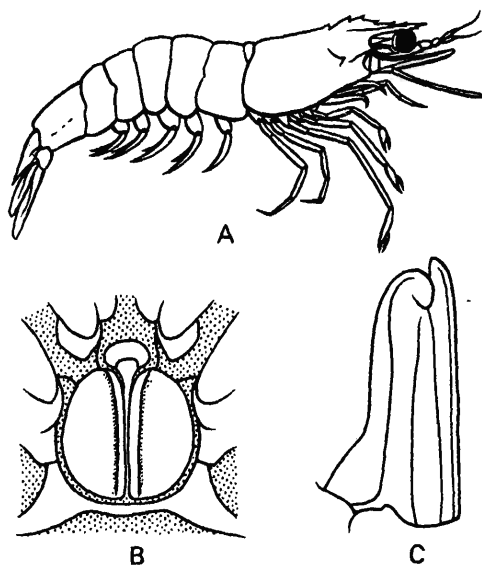


Figure 16. *Penaeus merguensis* de Man (from Dall, 1957).

A—lateral view; B—thelycum;
C—petasma.

12. Rostral crest triangular; adrostral carina does not extend to epigastric tooth (Figure 16) *P. merguensis* de Man, 1888.
- 21 — Rostral crest convex and not triangular; adrostral carina extends just beyond epigastric tooth *P. penicillatus* Alcock, 1905.
13. Gastrofrontal grooves form a loop; dorsolateral grooves absent on sixth abdominal somite 21.
- Gastrofrontal grooves simple, do not loop; dorsolateral grooves present on sixth abdominal somite 14.
14. Shrimps inhabit Atlantic coast of Africa and North, Central, and South America 15.
- Shrimps inhabit Pacific coast of North, Central, and South America 20.
15. Petasma with long distomedian projections with distal folds, which penetrate deeply into petasma and form large "auricles". Anteromedian corners of lateral plates of thelycum project forward and cover posterior process of median plate (Figure 17)
. *P. brasiliensis* Latreille, 1817.
- Petasma with relatively short distomedian projections with distal folds and do not form "auricles"; height of ventral crest that of

- adjacent membranous part. Anteromedian corners of lateral plates of thelycum do not project. Posterior process open.16.
16. Distal part of ventral crest of petasma with small spines along free margin, broad, and proximally sharply curved. Anteromedian corners of lateral plates of thelycum mildly divergent. Posterior process of median plate with simple median carina17.
- 22 — Distal part of ventral crest of petasma unarmed along free margin, almost straight or somewhat arced, broadens gradually, and proximally curved. Anteromedian corners of lateral plates of thelycum widely divergent. Posterior process with a median, anteriorly bifurcated carina18.

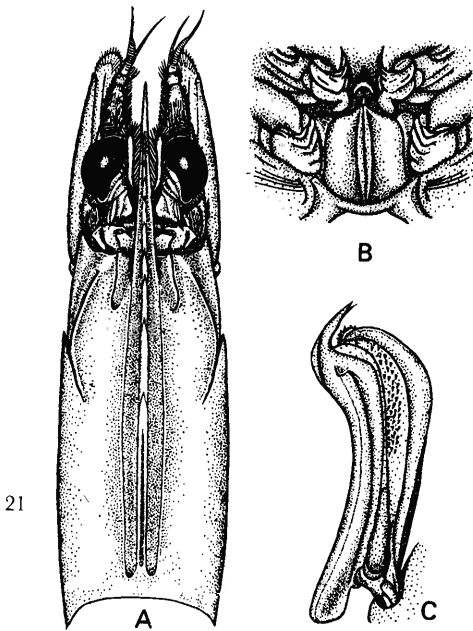
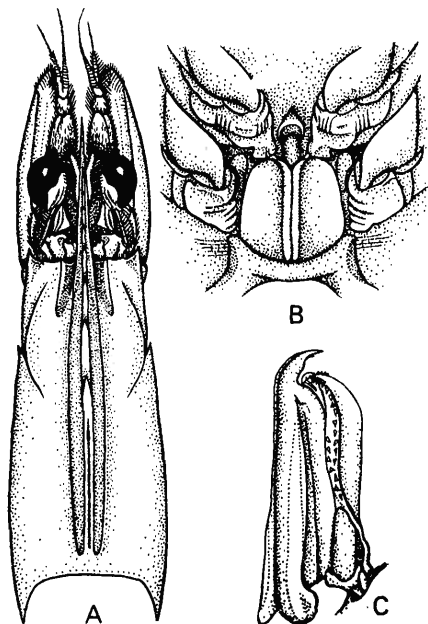


Figure 17. *Penaeus brasiliensis* Latreille (from Perez Farfante, 1969).

A—cephalothorax (dorsal view);
B—thelycum; C—petasma.

- 21
17. Dorsolateral grooves of sixth abdominal somite narrow; ratio between height of carina of sixth somite and width of groove (measured approximately at a distance of one-third the length of somite from its posterior margin) usually greater than three; grooves often almost entirely closed (Figure 18)*P. duorarum* Burkenroad, 1939.
- Dorsolateral grooves broad; ratio between carina height and groove width usually less than three*P. duorarum notialis* Perez Farfante, 1967.
18. Adrostral grooves long, almost reaching posterior margin of carapace, posteriorly deep and broad, and width four-fifths to two times greater than width of postrostral carina (measured at



21 Figure 18. *Penaeus duorarum* Burkenroad (from Perez Farfante, 1969).

A—cephalothorax (dorsal view);
B—thelycum; C—petasma.

- posterior one-eighth distance between posterior ends of adrostral grooves up to epigastric tooth) 19.
- Adrostral grooves relatively short, never close to posterior margin of carapace, posteriorly small and tapering, and width one-fifth to three-fourths of width of postrostral carina
..... *P. aztecus subtilis* Perez Farfante, 1967.
19. Median groove of postrostral carina long and deep throughout its length. Dorsolateral grooves broad; ratio between keel height and groove width usually less than three. Distal part of ventral crest of petasma narrows to a cusp, arced, and armed with an outwardly stretched group of closely set teeth on the attached margin. Anterior and posterior processes of median plate of thelycum broad (Figure 19) *P. aztecus* Ives, 1891.
23. Median groove short, shallow, and frequently interrupted. Dorsolateral grooves narrow; ratio between keel height and groove width greater than three; grooves often almost closed. Distal part of ventral crest of petasma obtuse, almost straight, and armed with irregularly arranged teeth. Anterior and posterior processes of median plate of thelycum narrow (Figure 20)
..... *P. paulensis* Perez Farfante, 1967.
20. Thelycum with a longitudinal carina in middle of sternite of pereopod V. Ventral surface of lateral plates of spermatheca not pubescent *P. californiensis* (Holmes), 1900.

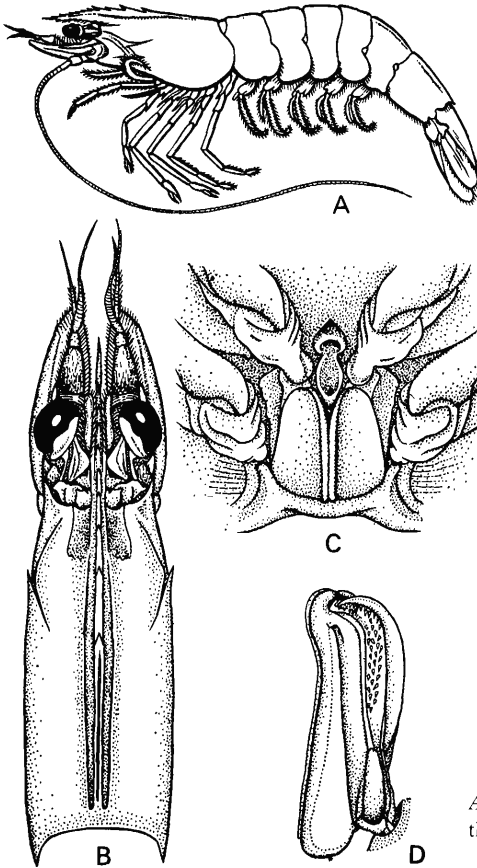


Figure 19. *Penaeus aztecus* Ives.

A—lateral view; B—cephalo-
thorax (dorsal view); C—thely-
cum; D—petasma.

22

- Thelycum without longitudinal carina in middle of sterna of pereopod V. Ventral surface of lateral plates of spermatheca pubescent *P. brevirostris* Kingsley, 1878.
- 21. Coxa of pereopods I, II, and III armed with spines *P. kerathurus* (Forskal), 1775.
- Coxa of first three pereopods without spines 22.
- 22. Ischium and basis of pereopod I armed with spines 23.
- Spines present only on basis of pereopod I. Exceptionally small rounded outgrowth replaces spine on ischium 24.
- 23. Antennular flagella equal in length to peduncle. Median groove absent on postrostral carina *P. marginatus* Randall, 1840 (*P. teraoi* Kubo, 1949).
- Antennular flagella no more than half length of peduncle. Median groove present on postrostral carina (Figure 21) *P. longistylus* Kubo, 1943.

Figure 20. *Penaeus paulensis* Perez Farfante (from Perez Farfante, 1969).

A—cephalothorax (dorsal view);
B—thelycum; C—petasma.

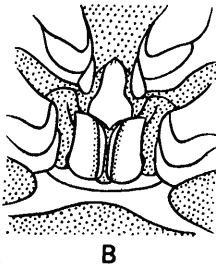
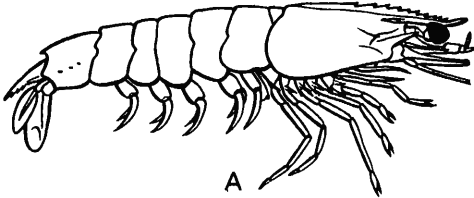
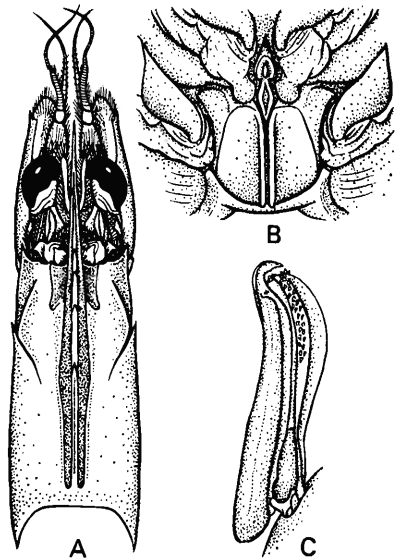


Figure 21. *Penaeus longistylus* Kubo (from Dall, 1957).

A—lateral view; B—thelycum;
C—petasma.

- 24. Telson with dorsolateral spine25.
- Telson without dorsolateral spine
.....*P. canaliculatus* (Olivier), 1811.
- 24 25. Pair of additional carinae on rostral blade; loop of gastrofrontal
grooves trifurcate (Figure 22)*P. plebejus* Hess, 1865.
- Rostrum without additional carinae; loop of gastrofrontal grooves
bifurcate26.
- 26. Apex of median plate of thelycum rounded; spermatheca cylindrical
and not composed of two lateral plates. Adrostral grooves narrower

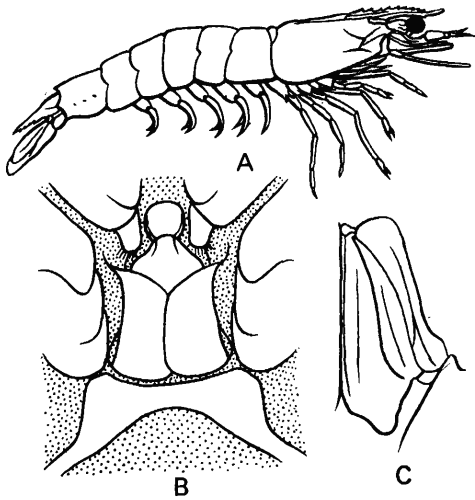


Figure 22. *Penaeus plebejus* Hess (from Dall, 1957).

A—lateral view; B—thelycum; C—petasma.

than postrostral carina *P. japonicus* Bate, 1888.
 Apex of median plate of thelycum bifurcate; spermatheca consists of two lateral plates. Adrostral grooves equal in width to postrostral carina (Figure 23) *P. latisulcatus* Kishinouye, 1896.

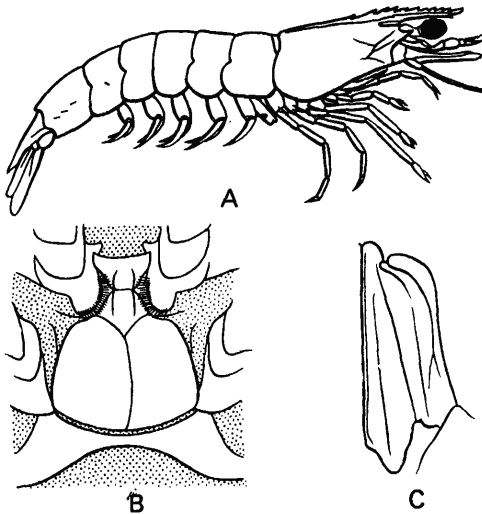


Figure 23. *Penaeus latisulcatus* Kishinouye (from Dall, 1957).

A—lateral view; B—thelycum; C—petasma.

Genus Funchalia Johnson, 1867

KEY TO SPECIES (FROM DALL, 1957)

1. Rostrum with ventral teeth. Antennal spine absent

-*F. balboae* (Faxon), 1893.
- Rostrum without ventral teeth. Antennal spine present2.
2. Hepatic spine present in adult specimens. More than 10 rostral teeth present3.
- Hepatic spine absent in adult specimens. Rostral teeth less than 10.4.
3. Abdominal somite VI with a short carina located below and parallel to the long midlateral carina. Spermatheca open.
.....*F. woodwardi* Johnson, 1867.
- Abdominal somite VI with only a long midlateral carina. Spermatheca consists of a pair of flaps*F. danae* Burkenroad, 1940.
- 25 4. Petasma with a small triangular projection on ventral surface of free distal part of larger endopod. Thelycum with very small median crest behind spermatheca (Figure 24) ..*F. villosa* (Bouvier, 1905).
- Petasma without projection on ventral surface of distal part of larger endopod. Thelycum with large median dentate tubercle behind spermatheca*F. taaningi* Burkenroad, 1940.

Genus *Xiphopenaeus* Smith, 1869

KEY TO SPECIES

1. Shrimps inhabit Atlantic coast of America (Figure 25)
.....*X. kroyeri* (Heller, 1862).
- Shrimps inhabit Pacific coast of America
.....*X. riveti* (Bouvier), 1907.

Genus *Parapenaeus* Smith, 1885

KEY TO SPECIES (FROM DALL, 1957)

1. Branchiostegal spine present. Pereopod V does not reach end of scaphocerite2.
- Branchiostegal spine absent. Pereopod V exceeds scaphocerite by length of dactyl*P. longipes* Alcock, 1905.
2. Branchiostegal spine on anterior margin of carapace3.
- Branchiostegal spine slightly behind anterior margin of carapace ..
.....7.
3. Abdominal somite VI less than twice length of somite V.4.
- Abdominal somite VI a little more than twice length of somite V. ...
.....*P. americanus* Rathbun, 1901.
4. Process "a" of petasma bifurcate and directed laterally5.
- 26 — Process "a" simple and pointed and directed distally6.
5. Process "b" of petasma long and sharply pointed. Process "d"

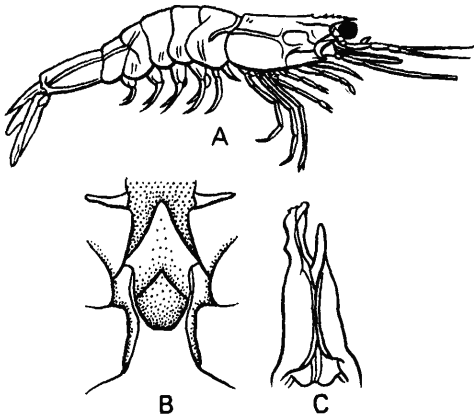


Figure 24. *Funchalia villosa* (Bouvier). A—lateral view; B—thelycum; C—petasma.

25

present. Thelycum consists of anterior intermediate and posterior plates *P. fissurus* (Bate), 1888.

- Process “b” short and obtuse; process “d” absent. Thelycum consists of anterior and posterior median bosses and two pairs of anterior and posterior lateral bosses
 *P. sextuberculatus* Kubo, 1949.

6. Process “d” of petasma well developed. Adrostral carina terminates

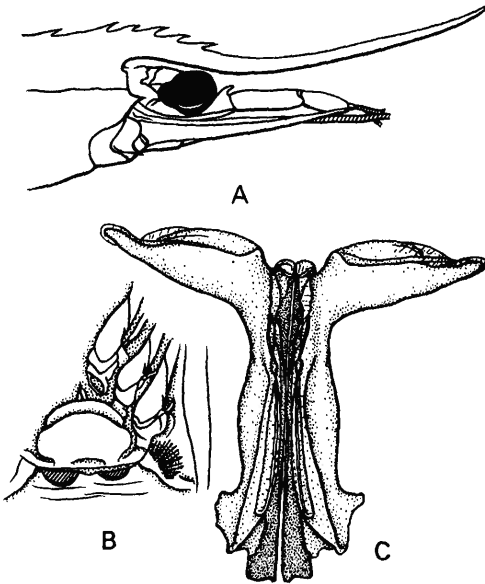


Figure 25. *Xiphopenaeus kroyeri* (Heller, 1862) (from Williams, 1965). A—frontal part of cephalothorax (lateral view); B—thelycum; C—petasma.

25

- behind rostral teeth. Longer antennular flagellum shorter than antennular peduncle (Figure 26) *P. australiensis* Dall, 1958.
- Process "d" small and dentiform. Adrostral carina almost reaches epigastric tooth. Longer antennular flagellum longer than antennular peduncle *P. lanceolatus* Kubo, 1949.
7. Rostrum reaches distal end of first segment of antennular peduncle. Abdominal somite VI more than twice length of somite V
 *P. investigatoris* Alcock and Anderson, 1899.
8. Rostrum reaches rostral* distal end of second segment of antennular peduncle. Abdominal somite VI slightly less than twice length of somite V (Figure 27) *P. longirostris* (Lucas, 1849).

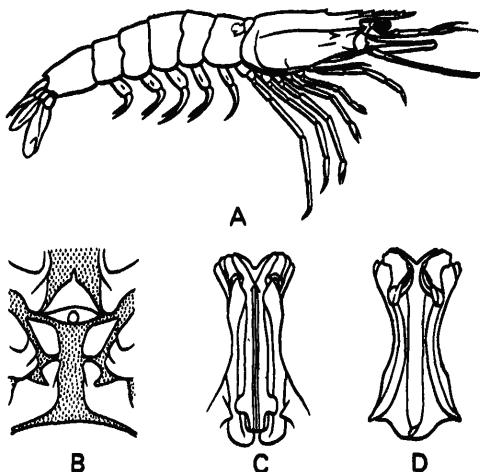


Figure 26. *Parapenaeus australiensis* Dall (from Dall, 1957).

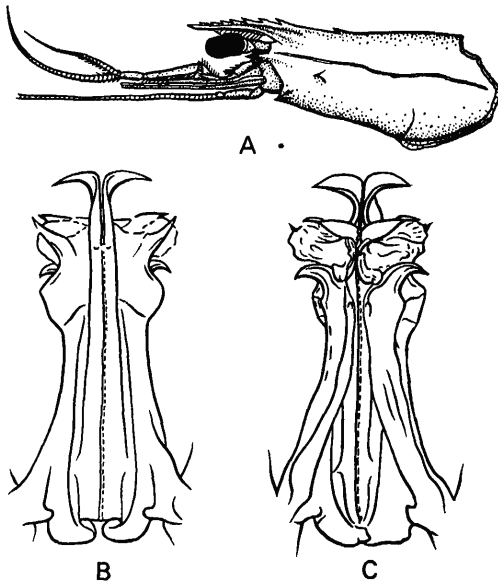
A—lateral view; B—thelycum; C—petasma (dorsal view); D—petasma (ventral view).

Genus *Parapenaopsis* (Alcock), 1901

KEY TO SPECIES

1. Shrimps inhabit shelf of Western Africa *P. atlantica* Balss, 1926.
- Shrimps inhabit Indian and Pacific Oceans 2.
2. Mastigobranchiae present on pereopods I and II 8.
- 27 — Mastigobranchiae absent on pereopods I and II 11.
3. Pereopod I with basal spines 4.
- Pereopod I without basal spines 10.
4. Pereopod II with basal spines 5.
- Pereopod II without basal spines *P. uncta* (Alcock), 1905.

*Error in original. Should simply read "distal end"—Technical Editor.



26 Figure 27. *Parapenaeus longirastris* (Lucas) (from Williams, 1965).
 A—cephalothorax (lateral view); B—petasma (dorsal view); C—petasma (ventral view).

5. Telson with pair of immovable subapical spines. At least distal half of free portion of rostrum unarmed
 *P. stylifera* (Milne-Edwards), 1837.
- Telson without subapical spines and with or without movable lateral spines. One-third or less of free portion of rostrum unarmed6.
6. Petasma with pair of long, slender, caliper-like distolateral projections directed forward. Thelycum with median tuft of long setae behind posterior edge of last thoracic sternite7.
- Petasma with pair of distolateral projections directed laterally or distolaterally, usually short and spout-like.8.
7. Pereopod III of female with basal spine. Rostrum with 9 to 11 teeth. Postrostral carina convex and extends to posterior margin of carapace*P. maxillipedo* (Alcock), 1905.
- Pereopod III of female without basal spine. Rostrum with 7 to 8 teeth. Postrostral carina straight and does not extend to posterior margin of carapace (Figure 28) *P. cornuta* (Kishinouye), 1900.
8. Postrostral carina almost reaches posterior margin of carapace. Petasma with pair of short, spout-like distolateral projections and pair of cap-like distal projections.9.
- Postrostral carina occupies three-fourths length of carapace. Petasma with pair of distolateral projections directed laterally. Cap-

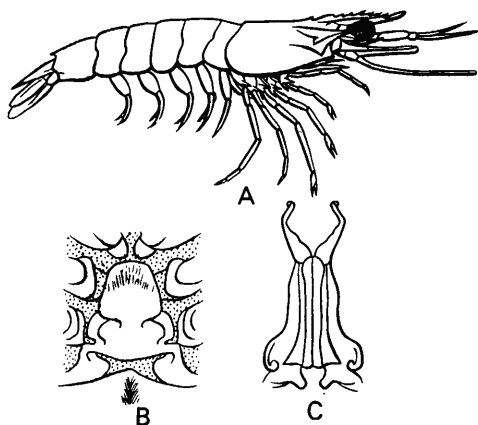


Figure 28. *Parapenaopsis cornuta* (Kishinouye) (from Dall, 1957).

A—lateral view; B—thelycum; C—petasma.

- like distal projections absent. *P. nana* (Alcock), 1905.
9. Antennular flagella equal to 0.5 to 0.6 of carapace length. Thelycum with median tuft of setae on posterior plate (Figure 29)
 *P. sculptilis* (Heller), 1862.
- Antennular flagella equal to 0.7 or more of carapace length. Thelycum without median tuft of setae
 *P. hardwickii* (Miers), 1878.

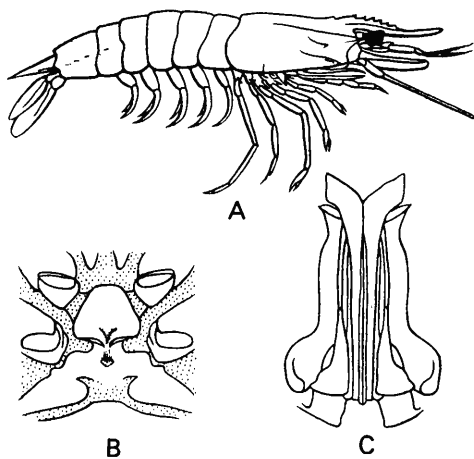
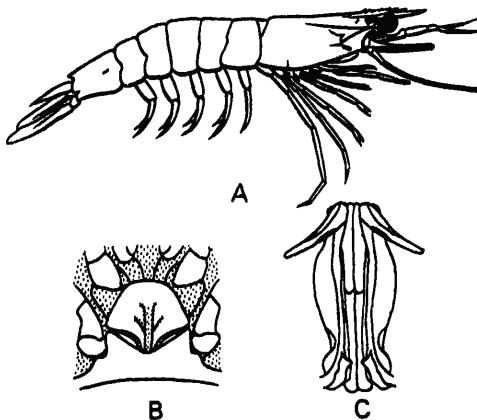


Figure 29. *Parapenaopsis sculptilis* (Heller) (from Dall, 1957).

A—lateral view; B—thelycum; C—petasma.

- 10. Epigastric spine present (species restricted to Pacific coast of America)*P. balli* Burkenroad.
- Epigastric spine absent*P. gracillima* Nobili, 1903.
- 11. Epigastric spine present12.
- Epigastric spine absent13.
- 12. Rostrum extends somewhat beyond tip of antennular peduncle.
- 29 Longitudinal suture about 0.9 carapace length from anterior margin*P. hungerfordi* (Alcock), 1905.
- Rostrum short, reaching tip of first segment of antennular peduncle. Longitudinal suture extends to hepatic spine.*P. venusta* de Man, 1907.
- 13. Anterior plate of thelycum with Z-shaped posterior edge. Two accessory crests on anterior edge of posterior plate. Rostrum with proximal one-third raised from carapace and remaining portion more or less horizontal. Antennular flagella equal in length to peduncle (Figure 30)*P. tenella* (Bate), 1888.
- Anterior plate of thelycum with more or less straight transverse posterior edge. No accessory crests on anterior edge of posterior plate. Rostrum inclined at an angle to carapace throughout its length. Antennular flagella half as long as peduncle*P. acclivirostris* Alcock, 1905.



28 Figure 30. *Parapenaopsis tenella* (Bate) (from Dall, 1957).
 A—lateral view; B—thelycum; C—petasma.

Genus *Atypopenaeus* Alcock, 1906

KEY TO SPECIES (FROM STAROBOGATOV, 1972)

- 1. Hepatic groove present2.

- Hepatic groove absent (Figure 31) *A. formosus* Dall, 1957.
- 2. Hepatic spine present *A. stenodactylus* (Stimpson), 1860.
- Hepatic spine absent *A. dearmatus* de Man, 1907.

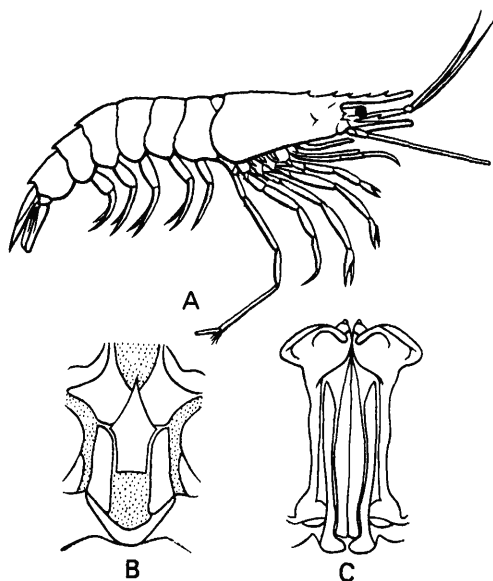


Figure 31. *Atyopopenaeus formosus* Dall (from Dall, 1957).
 A—lateral view; B—thelycum; C—petasma (dorsal view).

28

Genus *Trachypenaeopsis* Burkenroad, 1934

KEY TO SPECIES (FROM ANDERSON AND LINDNER, 1945)

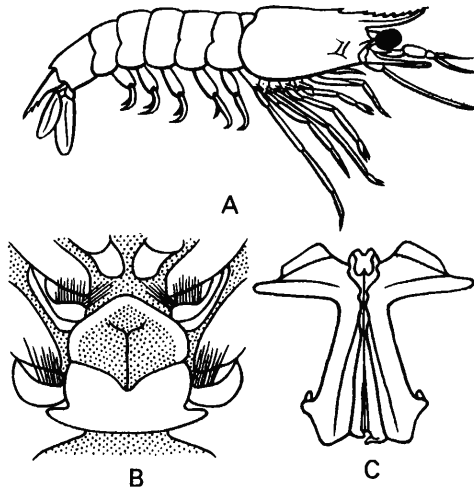
- 1. Species inhabits Atlantic coast of America
 *T. mobilispinis* (Rathbun).
- Species inhabits Indo-Pacific region
 *T. richtersii* (Miers), 1884.

Genus *Trachypenaeus* Alcock, 1901

KEY TO SPECIES (FROM DALL, 1957, WITH ADDITIONS)

- 1. Epipods (mastigobranchiae) present on pereopods I and II2.
- Epipods absent on pereopods I and II3.
- 2. Small spine present on ischium of pereopod I. No basal spine on maxilliped III. Carapace with longitudinal suture which does not surpass hepatic spine3.

- Ischium of pereopod I without spine. Maxilliped III with basal spine. Carapace with longitudinal suture which surpasses hepatic spine4.
- 3. Rostrum does not extend beyond distal margin of eyes. Telson with four pairs of lateral spines (species inhabits Pacific coast of America)*T. brevisutur* Burkenroad, 1934.
- Rostrum extends beyond distal margin of eyes. Telson with three or four pairs of lateral spines (species inhabits Indo-Pacific region) (Figure 32)*T. curvirostris* (Stimpson), 1860.
- 4. Telson without spines* (Pacific coast of America)
.....*T. byrds* Burkenroad, 1934.
- Telson with spines*5.



28

Figure 32. *Trachypenaeus curvirostris* (Stimpson) (from Dall, 1957).

A—lateral view; B—thelycum; C—petasma (ventral view).

- 5. Rostrum with 7 to 10 teeth, usually 8 or more6.
- Rostrum with 6 or 7 teeth7.
- 6. Exopod of pereopod V does not reach distal end of its basis. Telson tapers gradually to a point but with feeble proximal shoulder. Color orange or red*T. similis* (Smith, 1885).
- 30 — Exopod of pereopod V reaches distal end of its basis or extends beyond it. Telson with distinct subapical shoulder. Color pale lilac or chocolate (Figure 33)*T. constrictus* (Stimpson), 1871.
- 7. Posteriormost pair of lateral spines on telson immovable.

*Omission in original. Should read “lateral spines”—Technical Editor.

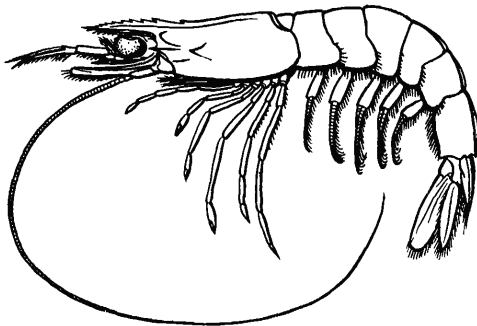


Figure 33. *Trachypenaus constrictus* (Stimpson) (from Williams, 1965).

Lateral view.

- *T. fuscina* Perez Farfante, 1971.
- Posteriormost pair of lateral spines on telson movable
- *T. faoea* Loesch and Avila, 1964.
- 8. Anterior plate of thelycum with prominent longitudinal crest (male not known)
- *T. pescadoreensis* Schmitt, 1926.
- Anterior plate of thelycum flat or concave (except for posterior margin)
- 9.
- 31 9. Distolateral projections of petasma anteriorly directed
- 10.
- Distolateral projections of petasma laterally directed (Figure 34) ..
- *T. fulvus* Dall, 1957.

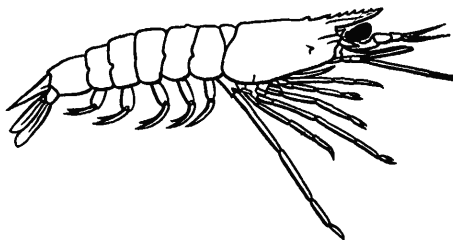
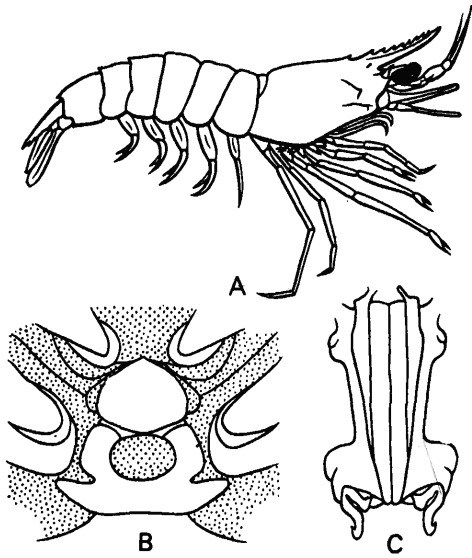


Figure 34. *Trachypenaus fulvus* Dall. Lateral view.

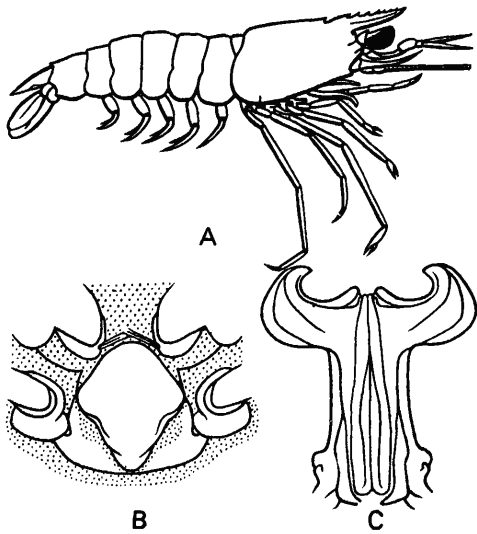
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- 10. Distolateral projections of petasma with blunt ends; extend to coxa of pereopod III. Posterior plate of thelycum Z-shaped and envelops an open oval depression (Figure 35)
- *T. anchoralis* (Bate), 1888.
- Distolateral projections of petasma with sharp ends; extend to coxa of pereopod IV. Anterior plate of thelycum with ligulata protuberance which extends to posterior plate (Figure 36)
- *T. granulatus* (Haswell), 1879.



30

Figure 35. *Trachypenaeus anchoralis* (Bate) (from Dall, 1957).
 A—lateral view; B—thelycum; C—petasma (dorsal view).



30

Figure 36. *Trachypenaeus granulatus* (Haswell) (from Dall, 1957).
 A—lateral view; B—thelycum; C—petasma.

Genus *Penaeopsis* (Bate, 1881)

KEY TO SPECIES

1. No more than 14 rostral teeth (excluding epigastric); none situated on carapace2.
- Usually 18 rostral teeth; one located on carapace
.....*P. megalops* Smith, 1885.
2. Rostrum slightly decurved; teeth 10 to 14. Hepatic spine at level of antennal one. Pterygostomian spine located just above anterolateral corner of carapace (Figure 37)*P. rectacuta* (Bate, 1888).
- Rostrum slightly upcurved; teeth 9 to 10. Hepatic spine below antennal one, situated midway between antennal and pterygostomian spines. Pterygostomian spine situated at farthest anterolateral corner of carapace*P. serrata* Bate, 1888.

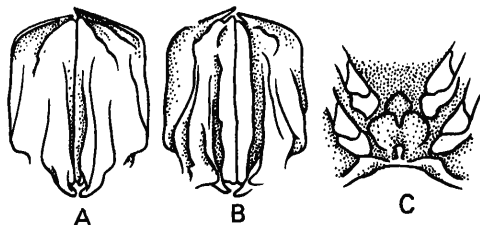


Figure 37. *Penaeopsis rectacuta* Bate (from Kubo, 1949).

A—petasma (dorsal view); B—petasma (ventral view); C—thelycum.

32

Genus *Metapenaeopsis* Bouvier, 1905

(from Anderson and Lindner, 1945; Racek and Dall, 1965;
and Perez Farfante, 1971)

KEY TO SPECIES

1. Shrimps inhabit Pacific coast of America and Atlantic Ocean ...2.
- Shrimps inhabit Indo-West-Pacific region10.
2. Shrimps inhabit Atlantic Ocean3.
- Shrimps inhabit Pacific coast of America8.
3. Shrimps inhabit Atlantic coast of Africa
.....*M. miersi* Holthuis, 1952.
- Shrimps inhabit Atlantic coast of America4.
4. Thelycum with median plate with U-shaped marginal strip and coiled lateral strips. Petasma with distoventral lobe deeply cleft into two long, subequal lobules (Figure 38)
.....*M. smithi* (Schmitt), 1924.

33

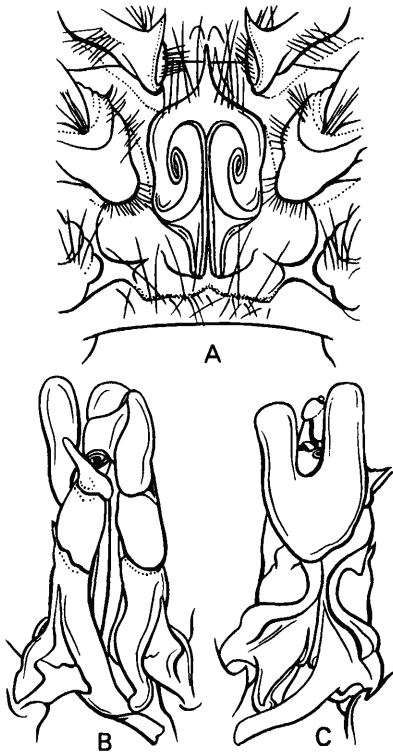
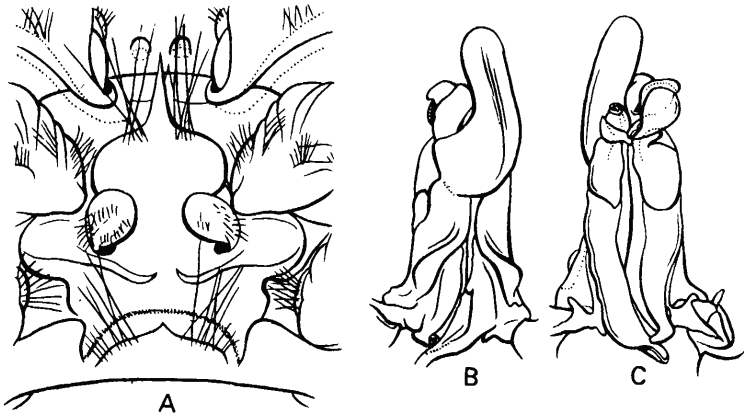


Figure 38. *Metapenaepsis smithi* (Schmitt).

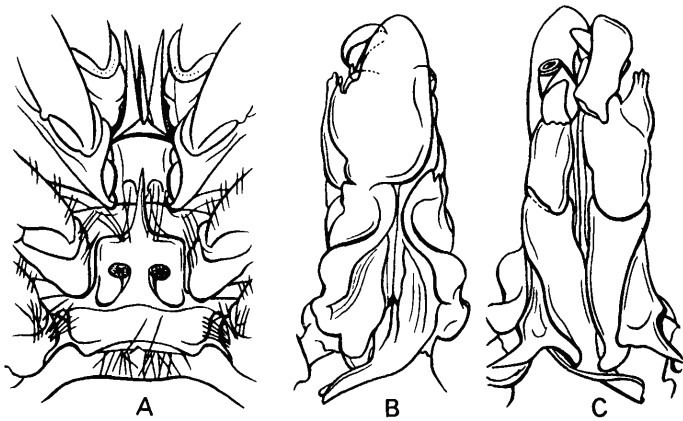
A—thelycum; B—petasma (ventral view); C—petasma (dorsal view).

31

- Thelycum with median plate without U-shaped marginal strip and coiled lateral strips. Petasma with simple distoventral lobe forming single lobule, or divided by shallow sinus into two subequal or unequal lobules.5.
- 5. Thelycum with anteromedian part of transverse plate highly depressed; median plate with prominent bosses with posterolateral angles produced. Petasma with projection forms one lobe (Figure 39).
*M. hobbsi* Perez Farfante, 1971.
- Thelycum with anteromedian part of transverse plate raised; median plate with bosses with posterolateral angles not produced. Distoventral projection of petasma divided by a shallow sinus into two lobules6.
- 6. Thelycum with anterior part of median plate convex, with two large bosses. Distoventral projection of petasma mitten-shaped; large left lobule extends far beyond small right lobule (Figure 40).
*M. gerardoii* Perez Farfante, 1971.



32 Figure 39. *Metapenaopsis hobbsi* Perez Farfante.
A—thelycum; B—petasma (ventral view); C—petasma (dorsal view).



32 Figure 40. *Metapenaopsis gerardoi* Perez Farfante.
A—thelycum; B—petasma (ventral view); C—petasma (dorsal view).

- Thelycum with anterior part of median plate concave, with two small bosses. Distoventral projection of petasma distally divided into two subequal or equal lobules; if unequal, larger lobule does not extend distally much beyond smaller one 7.
- 7. Thelycum with anterior part of median plate long, constituting at least half length of plate. Distoventral projection of petasma divided into two unequal lobules; right lobule much larger than left (Figure 41) *M. goodei* (Smith), 1885.
- Thelycum with anterior part of median plate short, less than half

length of plate. Distoventral projection of petasma divided into two subequal lobules; left lobule slightly larger than right (Figure 42)*M. martinella* Perez Farfante, 1971.

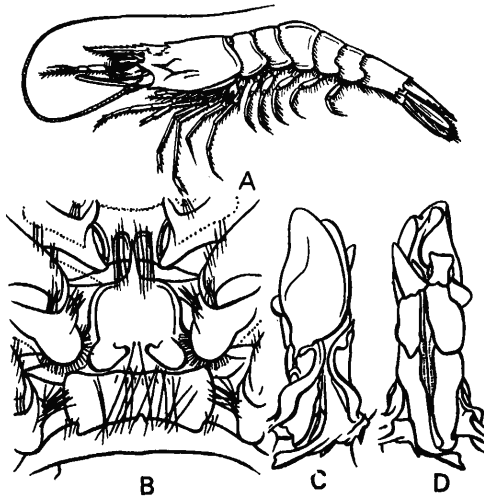
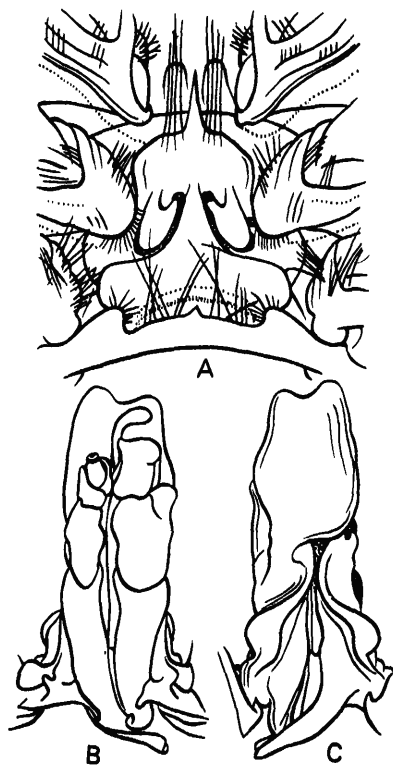


Figure 41. *Metapenaeopsis goodei* (Smith) (from Perez Farfante, 1971).

A—general view; B—thelycum; C—petasma (ventral view); D—petasma (dorsal view).

8. Basis of pereopod II unarmed*M. kishinouye* (Rathbun).
- Basis of pereopod II armed9.
9. Rostrum with 9 to 10 teeth (together with epigastric one).
-*M. beebei* Burkenroad.
- Rostrum with 11 to 12 teeth*M. mineri* Burkenroad.
10. Anteromedian spine on basal segment of antennule small and barely noticeable. Thelycal plate without posterior processes (platelets)11.
- 34 — Anteromedian spine on basal segment of antennule well developed. Thelycal plate with posterior processes.32.
11. Stridulatory organ present on posterior margin of branchiostegite12.
- Stridulatory organ absent on posterior margin of branchiostegite21.
12. Rostrum distinctly sinuate. Length of abdominal somite VI more than twice its height near posterior end. Right lobe of petasma slightly longer than left (Figures 43 and 44).
-*M. sinuosa* Dall, 1957.
- 35 — Rostrum slightly sinuate, straight, or upcurved. Length of abdominal somite VI less than twice its height near posterior end. Left lobe

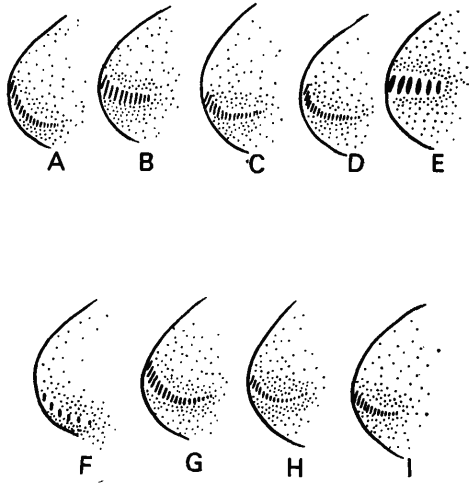


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Figure 42. *Metapanaeopsis martinella* Perez Farfante.

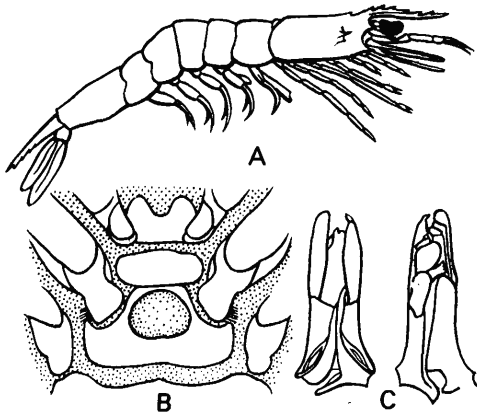
A—thelycum; B—petasma (ventral view); C—petasma (dorsal view).

- of petasma much longer than right 13.
13. Dorsal carina of abdominal somite III grooved 14.
 — Dorsal carina of abdominal somite III raised or flat 19.
14. Groove narrow and deep. Stridulatory organ low and highly curved; anterior ridge small and indistinct in front. Intermediate plate of thelycum with a deep transverse groove in posterior part 15.
 — Groove broad and small. Stridulatory organ high and moderately curved or almost straight, anterior ridge broad. Intermediate plate of thelycum with broad but shallow depression 18.
15. Pterygostomial spine very large (see Figure 43, C)
 *M. crassissima* Racek and Dall, 1965.
 — Pterygostomial spine small or medium in size 16.
16. Left lobe of petasma with radial processes originating from U-shaped distal part (Figure 45) *M. rosea* Racek and Dall, 1965.
 — Left lobe of petasma with radial processes originating from conical or pyriform part 17.



34 Figure 43. Arrangement and shape of stridulatory organ in some species of *Metapenaeopsis* (from Racek and Dall, 1965).

A—*M. novaeguineae*; B—*M. palmensis*; C—*M. crassissima*; D—*M. rosea*; E—*M. stridulans*;
 F—*M. sinuosa*; G—*M. barbata*; H—*M. dura*; I—*M. acclivis*.



34 Figure 44. *Metapenaeopsis sinuosa* Dall (from Dall, 1957).

A—dorsal view; B—thelycum; C—petasma.

- 17. Apical processes irregularly scattered along tip of pyriform base. Rostrum moderately upcurved. Stridulatory organ consists of 15 to 20 ridges. Species found off Malaysia*M. toloensis* Hall, 1962.
- Apical processes originate radially from conical base. Rostrum highly upcurved. Stridulatory organ consists of 28 to 35 ridges. Species found off Japan (see Figures 43 and 46)
*M. dura* Kubo, 1949.

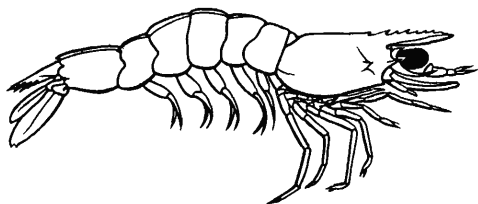


Figure 45. *Metapenaeopsis rosea* Racek and Dall (from Racek and Dall, 1965).

Lateral view.

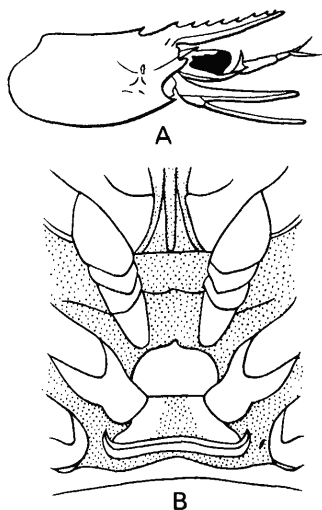


Figure 46. *Metapenaeopsis dura* Kubo (from Dall, 1957).

A—cephalothorax (lateral view); B—thelycum.

- 36 18. Stridulatory organ moderately curved. Anterior margin of thelycal plate slightly serrated. Left lobe of petasma distally broad. Rostrum slightly raised and straight, with teeth closely set (see Figure 43, *B*)
 *M. palmensis* (Haswell), 1879—*M. velutina* (Bate)—
M. barbeensis (Hall).
 — Stridulatory organ almost straight. Anterior margin of thelycal plate entire. Left petasmal lobe sharply pointed and triangular. Rostrum low and horizontal, with teeth widely scattered (Figure 47)
 *M. stridulans* (Alcock), 1905.
19. In female coxal plates of pereopod V separated by a narrow space which is much larger than thelycal plate (see Figure 43, *I*)
 *M. acclivis* (Rathbun, 1902).
 — In female coxal plates of pereopod V separated by a broad space

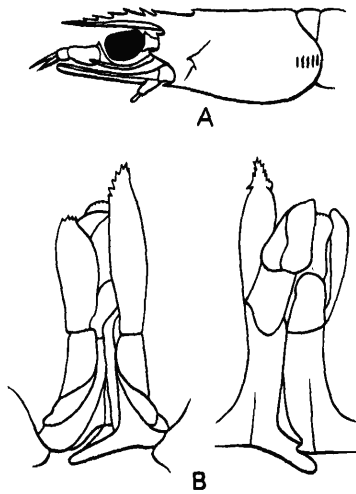


Figure 47. *Metapenaeopsis stridulans* (Alcock) (from Racek and Dall, 1965).
 A—cephalothorax (lateral view); B—petasma.

- which is smaller than thelycal plate20.
- 20. Thelycal plate larger in width than in length. Left petasmal lobe with processes arranged in a circle. Inner intermediate strip of same length as outer (see Figure 43, A and Figure 48)
*M. novaeguineae* (Haswell), 1879.
- Thelycal plate with equal width and length. Left petasmal lobe with processes arranged in a semicircle. Inner intermediate strip much longer than outer (see Figure 43, G).

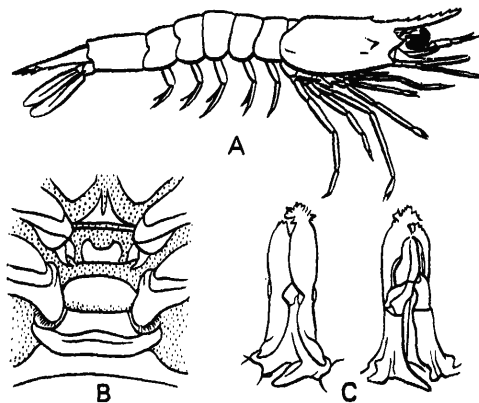


Figure 48. *Metapenaeopsis novaeguineae* (Haswell) (from Dall, 1957).
 A—lateral view; B—thelycum; C—petasma.

-*M. barbata* (de Haan), 1850—*M. akayebi* Rathbun.
21. Epigastric tooth situated a little posterior to middle of carapace. Scaphocerite twice as long as wide . . .*M. lamellata* (de Haan), 1850.
- Epigastric tooth situated at one-fourth length of carapace from its anterior margin. Scaphocerite much more than twice as long as wide22.
22. Female with two median spines, one behind the other, on sternum between pereopods IV and V*M. evermani* (Rathbun), 1906.
- In female sternum between pereopods IV and V merely a transverse plate23.
23. In female no spiny processes on sternum of pereopod II*M. velutina* (Dana), 1902.
- 37 — In female two long spiny processes present on sternum of pereopod II24.
24. Hepatic groove descends almost vertically toward ventral margin of branchiostegite (Figure 49)*M. borradaili* (de Man), 1910.
- Hepatic groove absent or does not reach branchiostegite25.

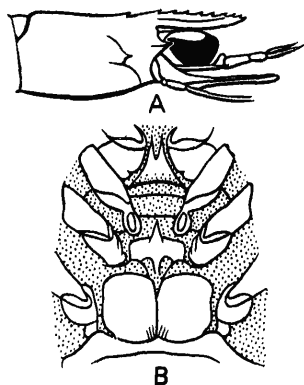


Figure 49. *Metapenaeopsis borradaili* (de Man) (from Dall, 1957).

A—cephalothorax (lateral view); B—thelycum.

25. One or two pairs of dentiform projections situated immediately behind thelycal plate26.
- Dentiform projections situated immediately behind thelycal plate absent27.
26. Pair of small sharp projections behind thelycal plate have a pair of sharp tubercles on the posterior margin of their base (Figure 50)*M. distincta* (de Man), 1907.
- Pair of dentiform projections behind thelycal plate without posterior tubercles (Figure 51)*M. mogiensis* (Rathbun) 1902—(*M. hilarula*) (de Man).

27. In female pair of spiny anterolateral processes absent on anterior sternal plate between pereopod V; triangular plate present on sternum between pereopod III28.

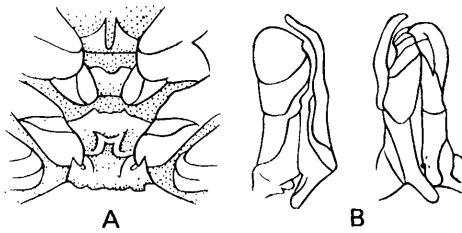


Figure 50. *Metapenaeopsis distincta* (de Man) (from Racek and Dall, 1965).

A—lateral view; B—thelycum.

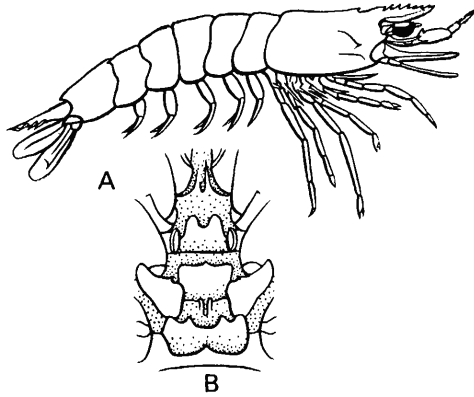


Figure 51. *Metapenaeopsis mogiensis* (Rathbun) (from Dall, 1957).

A—lateral view; B—thelycum.

- In female pair of spiny anterolateral processes present on anterior sternal plate between pereopod V; triangular plate absent on sternum between pereopod III29.
- 28. In female triangular plate on sternum between pereopod III sharply pointed toward anterior end; in male sternum between pereopod II with pair of long spiny processes. Upper margin of rostrum distinctly convex (Figure 52)*M. quinquedentata* (de Man), 1907.
- Triangular plate rounded anteriorly. In male sternum between pereopod II without spiny processes. Upper margin of rostrum slightly concave (Figure 53)*M. insona* Racek and Dall, 1965.
- 38 29. In female sternum between pereopod III without processes. Anterior sternal plate between pereopod V with large triangular

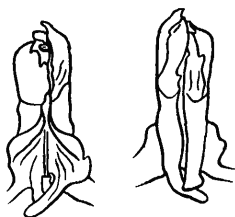


Figure 52. *Metapenaeopsis quinquedentata* (de Man) (from Racek and Dall, 1965).

Petasma.

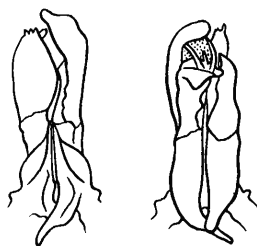


Figure 53. *Metapenaeopsis insona* Racek and Dall (from Racek and Dall, 1965).

Petasma.

- process in center *M. dalei* (Rathbun), 1902.
- In female sternum between pereopod III with one or two processes. Anterior sternal plate between pereopod V without large triangular process in center 30.
- 30. Sternum between pereopod III with a concave trapezoid plate which narrows posteriorly. Rostrum short and distinctly raised (Figure 54) *M. tarawensis* Racek and Dall, 1965.
- Sternum between pereopod III with pair of obtuse processes. Rostrum sharply pointed and not raised. *M. incompta* Kubo, 1949.
- 31. Posterior margin of posterior process of thelycal plate bifurcate 32.
- Posterior margin of posterior process of thelycal plate simple and pointed 36.
- 32. Rostrum equal in length or longer than antennular peduncle 33.
- Rostrum does not reach distal end of antennular peduncle 35.
- 33. Right petasmas lobe slightly larger than left *M. sibogae* (de Man), 1907.
- Left petasmas lobe slightly larger than right 34.
- 34. Posterior process of thelycal plate with indistinct median groove and sharp posterolateral corners *M. andamanensis* (Wood-Mason and Alcock), 1891.

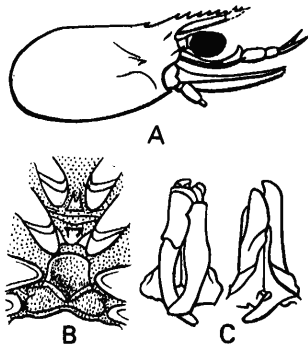


Figure 54. *Metapenaeopsis tarawensis* Racek and Dall (from Racek and Dall, 1965).

A—cephalothorax (lateral view); B—thelycum; C—petasma.

- Posterior process of thelycal plate with distinct median groove and rounded posterolateral corners
.....*M. philippi* (Bate) 1881—(*M. philippinensis* [Bate]).
- 35. Rostrum reaches posterior one-third of second antennular segment.
- 39 Center of thelycal plate with pair of short parallel ridges, forming a short median groove (Figure 55)
.....*M. provocatoria* Racek and Dall, 1965.
- Rostrum reaches anterior one-third of third antennular segment. No grooves in center of thelycal plate
.....*M. coniger* (Wood-Mason), 1891.
- 36. Abdomen dorsally carinate posterior to first somite

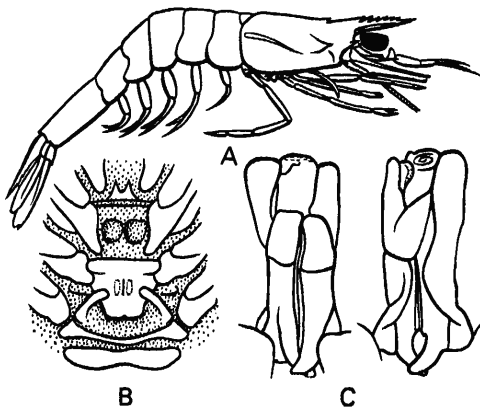


Figure 55. *Metapenaeopsis provocatoria* Racek and Dall (from Racek and Dall, 1965).

A—lateral view; B—thelycum; C—petasma.

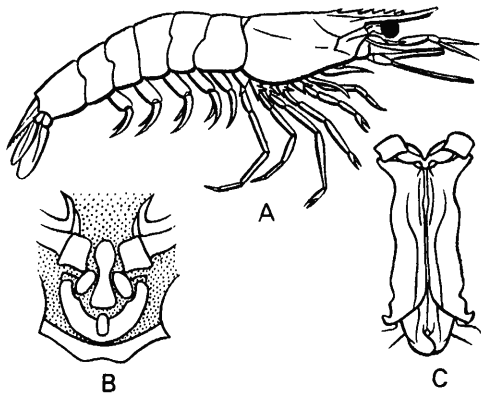


Figure 56. *Metapenaeus macleayi*
(Haswell) (from Dall, 1957).

A—lateral view; B—thelycum;
C—petasma.

-*M. lata* Kubo, 1949.
— Abdomen dorsally carinate posterior to second somite
.....*M. kyushuensis* (Yokoya), 1933.

Genus *Metapenaeus* Wood-Mason and Alcock, 1891

KEY TO SPECIES (FROM RACEK AND DALL, 1965)

1. Telson armed with three or four pairs of well-defined movable spines2.
- Telson with solitary row of very small movable spines, and with or without one to two pairs of fairly large distal spines3.*
2. Telson with three pairs of almost identical spines. Rostrum straight and dentate up to tip3.
- Telson with four pairs of spines which gradually increase in size posteriorly. Rostrum sigmoid; anterior half edentate and acicular (Figure 56)*M. macleayi* (Haswell).
3. Branchial part of carapace with small depressed areas. Long and dagger-shaped projections on coxa of pereopod IV.** Thelycum with rounded median boss posterior to lateral plates. Distomedian projections of petasma without anterolateral spiny processes
.....*M. intermedius* (Kishinouye), 1900.
- Branchial part of carapace with two large depressed areas. Female with straight conical spines on coxa of pereopod IV. Thelycum without rounded boss posterior to lateral plates. Distomedian projections of petasma with distinct anterolateral spiny processes (Figure 58)*M. endeavouri* (Schmitt), 1926.
4. Distomedian projection of petasma with well-developed or reduced

*Error in original. Should be "4"—Technical Editor.

**Omission in original. Should read "Pereopod IV in female"—Technical Editor.

- apical filament. Thelycum of impregnated female usually with white conjoined pads5.
- Distomedian projection of petasma without apical filament. Thelycum of impregnated female without white conjoined pads9.

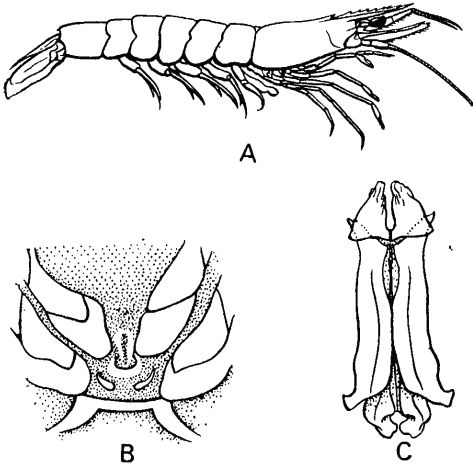


Figure 57. *Metapenaeus ensis* (de Haan) (from Kubo, 1949).
 A—lateral view; B—thelycum; C—petasma.

- 5. Rostrum broad and short; does not reach distal end of basal antennular segment. Thelycum with ovate anterior and lateral plates of subequal size; conjoined pads usually set askew. Apical filaments of petasma reduced and represented by pair of rounded bosses
*M. lysianassa* (de Man), 1888.
- Rostrum projects beyond basal antennular segment; distal part edentate6.
- 6. Posterior part of rostrum with fairly distinct carina. Basial spine on pereopod III of male simple7.
- Posterior part of rostrum without distinct carina. Basial spine on pereopod III of male long and sharp8.
- 7. Basial and ischial spines on pereopod I subequal. Telson usually with pair of distal spinules. Distolateral projections of petasma directed outward; apical filaments of distomedian projection slender and slightly convergent. Thelycum with a large anterior and small lateral plates*M. brevicornis* (H. Milne-Edwards), 1837.
- Ischial spine of pereopod I slightly smaller than basial spine. Telson usually with two pairs of distal spinules. Distolateral projections of petasma directed forward; apical filaments of distomedian projection spatulate. Thelycum with a small anterior and very large lateral plates*M. tenuipes* Kubo, 1949—(*M. spinulatus* Kubo).
- 8. Apical filaments of petasma indistinct. Anterior thelycal plate ligu-

- late *M. dobsoni* (Miers), 1878.
- Apical filaments of petasma large, spatulate, and dorsally curved. Anterior thelycal plate with sharp point *M. joyneri* (Miers), 1880.
9. Branchiocardiac groove distinct in at least posterior third of carapace. Distomedian projections of petasma flap-like 10.
- Branchiocardiac groove almost completely absent. Distomedian projections of petasma anteriorly filiform and with serrate ventral margin *M. stebbingi* (Nobili), 1904.
10. Ischial spine of pereopod I distinct 11.
- Ischial spine of pereopod I small or absent 13.
11. Ischial and basal spines of pereopod I subequal. Tips of petasma curved at a 30° angle in relation to median line and semicircular. Anterior plate of thelycum in the form of a depression. Lateral plates with raised ventral carinae with anterolateral and posteromedian spiny processes *M. suluensis* Racek and Dall, 1965.
- Ischial spine much smaller than basal spine. Anterior thelycal plate ligulate 12.
12. Distomedian projections of petasma directed anteriorly. Lateral thelycal plates with raised lateral carinae, each with a posterior incurved triangular plate. Species found eastward of the Strait of Malacca (Figure 57) *M. ensis* (de Haan) 1850—(*M. mastersii* [Haswell])—*M. incisipes* (Bate).
- Distomedian projections of petasma directed anterolaterally. Lateral thelycal plates with only raised and parallel lateral carinae. Species found westward of the Strait of Malacca *M. monoceros* (Fabricius), 1798.
13. Ischial spine of pereopod I small and obtuse 14.
- Ischial spine absent 17.
14. Teeth on rostrum arranged more or less uniformly. Thelycum open at posterior end 15.
- Rostral teeth random in arrangement: first two teeth separated from each other and from rostral tip by a greater distance. Thelycum closed at posterior end *M. demani* (Roux), 1922.
15. Distomedian projections of petasma divided into two lobes which almost completely cover distolateral projections from above. Lateral thelycal plates reniform with highly raised ventrolateral ridges *M. conjunctus* Racek and Dall, 1965.
- Distomedian projections of petasma more or less superficially divided into two lobes which do not cover distolateral projections from above. Lateral thelycal plates in the form of a small arc with raised lateral ridges 16.
16. Distomedian projections of petasma directed anteriorly. Parallel longitudinal grooves indistinct. Posterior end of raised ridges on

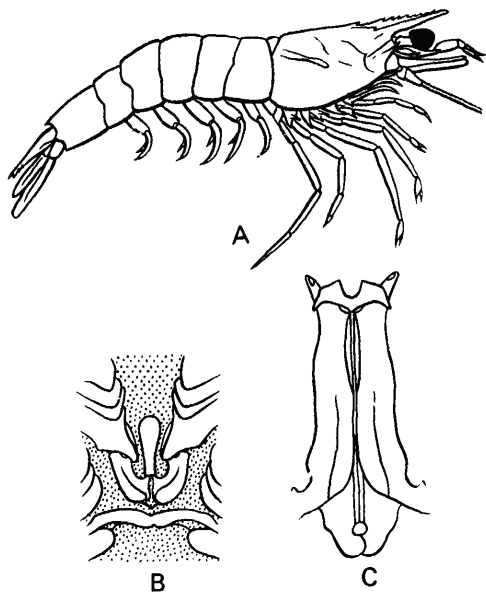


Figure 58. *Metapenaeus endeavouri* (Schmitt) (from Dall, 1957).

A—lateral view; B—thelycum; C—petasma.

- lateral plates of thelycum curves outward. Spine on merus of pereopod V slants inward slightly in male
- *M. papuensis* Racek and Dall, 1965.
- Distomedian projections of petasma directed anterolaterally and divergent. Longitudinal grooves distinct. Posterior end of ridges on lateral plates of thelycum incurved. Spine on merus of pereopod V slants outward slightly in male
- *M. elegans* (de Man) 1907—(*M. singaporensis* Hall).
17. Distal part of rostrum edentate. Anterior thelycal plate blunt. Lateral plates large and separated by narrow suture (Figure 59)
- *M. eboracensis* Dall, 1957.

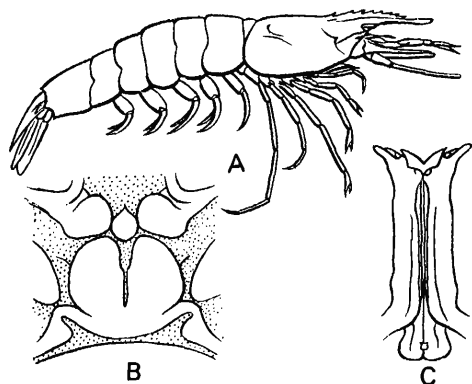


Figure 59. *Metapenaeus eboracensis* Dall (from Dall, 1957).

A—lateral view; B—thelycum; C—petasma.

- Distal part of rostrum dentate18.
- 18. Branchiocardiac carina distinct, extending from posterior margin of carapace almost up to hepatic spine. Anterior plate of thelycum longitudinally grooved, broader posteriorly than anteriorly. Distomedian projection of petasma sigmoid
M. affinis (H. Milne-Edwards), 1837—(*M. mutatus* Lanchester)—
M. necopinans Hall.
- Branchiocardiac carina faint or poorly defined; anterior end does not extend beyond posterior third of carapace19.
- 19. Anterior thelycal plate ligulate with a pair of anterolateral rounded tubercles. Lateral plates with characteristic patches of dense setae. Distomedian projections of petasma highly divergent, each in the form of a broad and outwardly curved tooth (Figure 60)
.....*M. insolitus* Racek and Dall, 1965.
- Anterior thelycal plate ampullar with longitudinal ridges in the center. Distomedian projections of petasma digitiform20.
- 20. Anterior margin of anterior thelycal plate with three tubercles ..21.

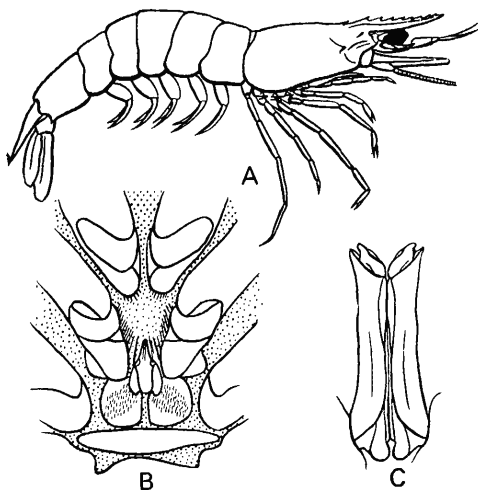


Figure 60. *Metapenaeus insolitus* Racek and Dall (from Racek and Dall, 1965).

A—lateral view; B—thelycum;
C—petasma.

- Anterior margin of anterior thelycal plate with two fang-shaped teeth and an indistinct tubercle. Petasma with slightly divergent tubercular distomedian projections*M. dalli* Racek, 1957.
- 43 21. Median tubercle more raised than marginate ones. Distal margin of anterior thelycal plate distinctly triangular. Petasma with almost parallel distomedian projections; distal half of latter dorsoventrally sinuate (Figure 61)*M. bennettiae* Racek and Dall, 1965.
- All tubercles identical in size. Distal margin of anterior thelycal plate convex to indistinctly triangular. Petasma with laminose and

highly divergent distomedian projections
*M. burkenroadi* Kubo, 1954.

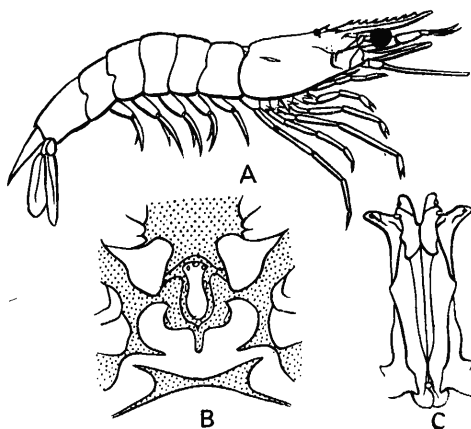


Figure 61. *Metapenaeus bennettiae*
 Racek and Dall (from Kirkegor
 and Welker, 1970).

A—lateral view; B—thelycum;
 C—petasma.

Subfamily SOLENOCERINAE Wood-Mason, 1891

KEY TO GENERA (ANDERSON AND LINDNER, 1945)

1. Antennular flagella foliate and together form a tube which acts as a siphon*Solenocera* Lucas.
- Antennular flagella round in cross section and filiform2.
2. Podobranchiae present on maxilliped III and all pereopods. Telson with several pairs of movable lateral spines anterior to distal pair of immovable teeth. Prosartherma in the form of a short, rough outgrowth*Haliporus* Bate.
- Podobranchiae absent on maxilliped III and all pereopods. Telson with only one pair of lateral spines. Prosartherma in the form of a long elastic scale*Hymenopenaeus* Smith.

Genus *Solenocera* Lucas, 1849

KEY TO SPECIES FROM ATLANTIC OCEAN AND PACIFIC COAST OF AMERICA¹ (FROM LINDNER AND ANDERSON, WITH ADDITIONS)

1. Shrimps inhabit Atlantic and Pacific coasts of America2.
- Shrimps inhabit Mediterranean Sea and waters near western and southern coasts of Africa (Figure 62)
 ...*S. membranacea* (H. Milne-Edwards), 1837—(*S. africana* Stebbing).

¹The geographic distribution of shrimps of this genus outside the stated limits has been assessed by Ya. I. Starobogatov (1972).

2. Shrimps inhabit Atlantic coast of America3.
 — Shrimps inhabit Pacific coast of America6.
 3. Number of rostral teeth vary from 8 to 10, usually 9. Postrostral
 44 carina high and sharp with a deep notch at level of cervical groove .
*S. vioscai* Burkenroad.
 — Number of rostral teeth vary from 5 to 7, usually 6. Postrostral
 carina absent or low, with a slight notch at level of cervical groove .
4.

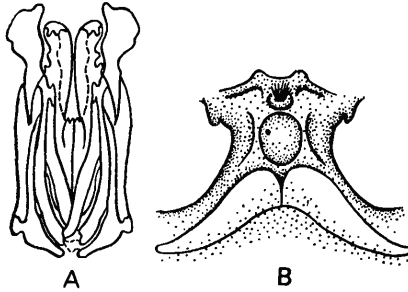


Figure 62. *Solenocera membranacea* (H. Milne-Edwards), 1837.

A—petasma; B—thelycum (drawn by Yu. M. Froermana).

4. Scaphocerites long, extending beyond end of antennular peduncle
 by at least 13% of their length. Feeble tooth located on orbital
 corner. Pterygostomial spine long and with a broad base
*S. necopina* Burkenroad.
 — Scaphocerites short, shorter than antennular peduncle. Antennules
 longer than scaphocerites by about 8% of their length. Well-
 developed tooth located on orbital corner. Pterygostomial spine
 small and with a narrow base5.
 5. Chela of pereopod I significantly shorter than carpus; finger almost
 twice length of palm. End of distolateral petasmas lobe directed
 distally. Projections of thelycum located between bases of last pair of
 pereopods and smoothly rounded . . .*S. atlantidis* Burkenroad, 1939.
 — Chela of pereopod I barely shorter than propodus; finger 2.0 to 2.5
 times longer than palm. End of distolateral petasmas lobe inwardly
 directed toward median line. Projections of thelycum located be-
 tween bases of last pair of pereopods and with distinct tubercles at
 apex.*S. geijskesi* Holthuis, 1959.
 6. Number of teeth on rostrum varies from 8 to 10, usually 9. Base of
 pterygostomial spine merges into margin of carapace with a smooth
 curve*S. agassizii* Faxon, 1893.
 — Number of teeth on rostrum varies from 6 to 8, usually 7. Base of

- pterygostomian spine merges into margin of carapace at a right angle7.
7. Sternum of pereopod IV in female sharply incurved along posterior margin. Median lobules of distolateral lobe of petasma almost rectangular *S. florea* Burkenroad.
- Sternum of pereopod IV in female rounded at posterior margin. Median lobules of distolateral lobe almost triangular *S. mutator* Burkenroad.

Genus *Haliporus* Bate, 1881

KEY TO SPECIES (FROM LINDNER AND ANDERSON, 1945)

1. Spine present on inner margin of basal segment of antennular peduncle. Merus of pereopod I with a strong spine. *H. thetis* Faxon, 1893.
- Spine absent on inner margin of basal segment of antennular peduncle. Merus of pereopod I without spine . . . *H. curvirostris* Bate, 1881.

Genus *Hymenopenaeus* Smith, 1882

KEY TO SPECIES (FROM ANDERSON AND LINDNER, 1945,
WITH ADDITIONS)

1. No postrostral teeth separated from rostral teeth by some distance2.
- One or two postrostral teeth separated from group of rostral teeth by some distance8.
2. Neither branchiostegal nor pterygostomian spine present3.
- Either branchiostegal spine, or pterygostomian, or both present4.
3. Epipods of maxillipeds II and III bifid (Figure 63) *H. tropicalis* (Bouvier), 1905.
- Epipods of maxillipeds II and III not bifid *H. mulleri* (Bate), 1888.
4. Branchiostegal and pterygostomian spines present *H. villosus* (Alcock and Anderson), 1894.
- Either of two spines absent5.
5. Branchiostegal spine present; pterygostomian spine absent6.
- Branchiostegal spine absent; pterygostomian spine present. *H. taprobanensis* (Alcock and Anderson, 1899).
6. Tooth or spine absent on orbital corner7.
- Tooth or spine present on orbital corner . . . *H. robustus* Smith, 1885.
7. Merus of pereopod I unarmed. Shrimps inhabit Atlantic coast of

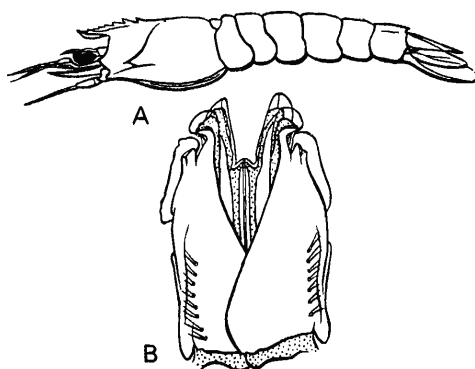


Figure 63. *Hymenopenaeus tropicalis* (Bouvier) (from Williams, 1965).

A—lateral view; B—petasma.

- America *H. modestus* Smith, 1885.
- Merus of pereopod I armed with spine. Shrimps inhabit Indo-Pacific region *H. lucasii* Bate, 1881.
8. One postrostral tooth separated from group of postrostral teeth by some distance 9.
- Two postrostral teeth separated from group of postrostral teeth by some distance 11.
9. Shrimps inhabit Pacific Ocean 10.
- Shrimps found off southern Africa *H. triarthrus* (Stebbing).
10. Merus of pereopod I with spine *H. diomedae* (Faxon), 1893.
- Merus of pereopod I without spine *H. sibogae* (de Man), 1907.
11. Pterygostomian spine present 12.
- Pterygostomian spine absent 14.
12. Species inhabits Indian and Pacific oceans 13.
- Species inhabits Atlantic Ocean *H. laevis* (Bate), 1881.
13. Species inhabits Pacific coast of America; carina on abdominal somites IV and V without sharp teeth
- Two species: *H. nereus* (Faxon), 1893 and *H. doris* (Faxon), 1893. Species differences have not been described; however, in the illustration *H. doris* is shown with a tooth on the postrostral carina behind the cervical suture.
- 46 — Species found in region of Maldivé Islands; carina on abdominal somites IV and V with sharp teeth *H. sewelli* Ramadan, 1938.
14. Species inhabits Atlantic Ocean 15.
- Species inhabits Indo-Pacific region 17.
15. Photophores absent 16.
- Photophores present *H. debilis* Smith, 1882.
16. Species inhabits northern part of Atlantic Ocean

-*H. aphoticus* Burkenroad, 1940.
 — Species inhabits region south of Gabon
*H. chacei* Crosnier and Forest, 1969.
 17. Grooves on branchiostegal regions of carapace do not form
 L-shaped pattern18.
 — Grooves on branchiostegal regions of carapace form L-shaped
 pattern*H. fattachi* Ramadan, 1938.
 18. Abdominal somites I, II, and III without carina19.
 — Abdominal somite III and possibly also I and II with carina
*H. propinquus* (de Man), 1907.
 19. Pereopod I with basial spine20.
 — Pereopod I without basial spine*H. aequalis* (Bate), 1888.
 20. Middle of posterior margin of dorsal side of abdominal somites IV,
 V, and VI without spines21.
 — Middle of posterior margin of dorsal side of abdominal somites IV,
 V, and VI with spines*H. neptunus* (Bate), 1881.
 21. Postcervical carina present on dorsal side of carapace; distoventral
 spine present on merus of pereopod I.
*H. obliquirostris* (Bate), 1881.
 — Postcervical carina and spine on merus of pereopod I absent
*H. halli* Bruce, 1966.

Subfamily BENTHESICYMINAE Bouvier, 1908

KEY TO GENERA (FROM TIRMIZI, 1958)

1. Prosarthema absent. No immovable spines on telson; tip of telson
 incised or terminates in a small spine2.
 — Prosarthema present. Telson with one pair of immovable distal
 spines in addition to three pairs of movable spines; tip of telson stout
 and sharply pointed. No podobranchiae on appendages after maxil-
 liped II. Median carina present on all abdominal somites. Maxil-
 liped III and all pereopods divided into secondary segments
*Gordonella* Tirmizi
 (only one species: *G. polyarthra* Tirmizi).
 2. Podobranchiae present on each appendage from maxilliped II up to
 pereopod III. Telson armed with more than one pair of movable
 lateral spines3.
 — Podobranchiae absent on appendages behind maxilliped II. Me-
 dian carina present only on abdominal somite VI. Telson with only
 one pair of movable spines; tip incised*Gennadas* Bate, 1881.
 3. In addition to median carina on abdominal somite VI, similar
 carinae also present on other somites of abdomen. Tip of telson
 usually pointed4.

- Median carina present only on abdominal somite VI. Tip of telson incised *Bentheogennema* Burkenroad, 1936.
- 4. Hepatic spine present or absent. Dactyls of pereopods IV and V typical, not divided into secondary segments *Benthescycymus* Bate, 1881.
- 47 — Hepatic spine present. Dactyls of pereopods IV and V flagellate and multisegmented *Benthonecthes* Smith
(only species: *B. filipes* Smith, 1884).

Genus *Bentheogennema* Burkenroad, 1936

KEY TO SPECIES

- 1. Cervical and postcervical sutures not close to each other dorsally ..
..... 2.
- Cervical and postcervical sutures very close to each other dorsally ..
..... *B. pasithea* (de Man), 1911.
- 2. Cervical and postcervical sutures uninterrupted by postrostral carina *B. borealis* (Rathbun), 1902.
- Cervical and postcervical sutures interrupted by postrostral carina
..... *B. intermedia* (Bate), 1882.

Subfamily ARISTAEINAE Alcock, 1901

KEY TO SPECIES (FROM ANDERSON AND LINDNER, 1945)

- 1. Hepatic spine present 2.
- Hepatic spine absent 3.
- 2. Podobranchia on pereopod III and epipod on pereopod IV rudimentary or absent *Hepomadus* Bate.
- Podobranchia on pereopod III and epipod on pereopod IV well developed (Figure 64, B) *Aristaeomorpha* Wood-Mason
(one species: *A. foliacea* [Risso], 1826).
- 3. Epipod on pereopod IV present. Podobranchia present on pereopod III but rudimentary 4.
- Epipod on pereopod IV and podobranchia on pereopod III absent *Aristeus* Duvernoy.
- 4. Epipod on pereopod IV rudimentary. Podobranchia on pereopod III small *Hemipenaeus* Wood-Mason.
- Epipod on pereopod IV and podobranchia on pereopod III well developed. Rostrum with three teeth *Plesiopenaeus* Bate.

Genus *Hepomadus* Bate, 1881

KEY TO SPECIES (FROM ANDERSON AND LINDNER, 1945)

- 1. Abdominal somites IV and V with teeth on posterior margin of

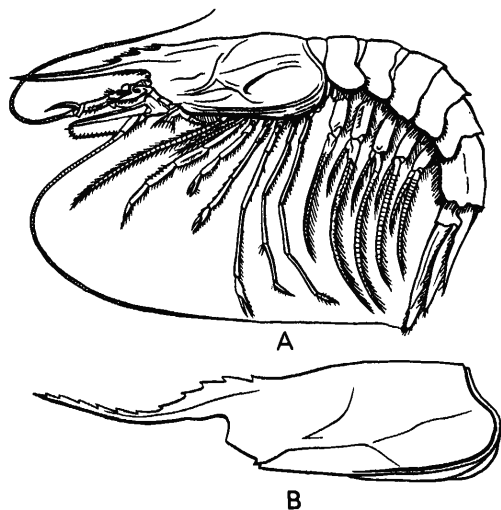


Figure 64. *A*—*Plesiopenaeus edwardsianus* Johnson (from Kronie, Bondy, and Lefeur, 1967); *B*—*Aristaeomorpha foliacea* (Risso) (from Perez Farfante, 1970).

- dorsal carina *H. gladialis* Bate, 1881.
 — Abdominal somites IV and V without teeth on posterior margin of dorsal carina *H. tener* Smith, 1884.

48

Genus *Hemipenaeus* Bate, 1881

KEY TO SPECIES FOUND IN ATLANTIC OCEAN (FROM ANDERSON AND LINDNER, 1945)

1. Large spine present on tergum of abdominal somite III 2.
- Large spine absent on tergum of abdominal somite III
 *H. speciosus* Bate, 1881.
2. Rostrum short; less than one-fifth length of carapace and not reaching tip of eyes *H. carpenteri* Wood-Mason, 1891.
- Rostrum at least one-fifth length of carapace and reaching tip of eyes *H. spinidorsalis* Bate, 1881.

Three more species of this genus have been reported from the Indo-Pacific region: *H. crassipes* Wood-Mason, 1891; *H. gracilis* Bate, 1881; and *H. sibogae* de Man, 1910.

Genus *Plesiopenaeus* Bate, 1881

KEY TO SPECIES (FROM ANDERSON AND LINDNER, 1945)

1. Exopod of maxilliped II equal in length to endopod or shorter . . . 2.

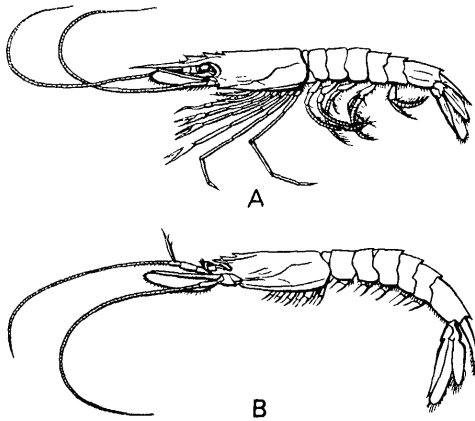


Figure 65. *Aristeus varidens* Holthuis (from Holthuis, 1952).

A—male; *B*—female.

- Exopod of maxilliped II approximately twice longer than endopod (see Figure 64, *A*) *P. edwardsianus* (Johnson), 1867.
- 2. Exopod of maxilliped II not longer than endopod. Merus of pereopods I and II with a movable spine. Basis and ischium of pereopod I without fixed tooth . . . *P. coruscans* (Wood-Mason), 1891.
- Exopod of maxilliped II much shorter than endopod. Ischium of pereopod I with strong tooth *P. armatus* (Bate), 1881.

Genus *Aristeus* Duvernoy, 1840

KEY TO SPECIES

1. Body smooth, without pubescence. Movable spine on distal end of merus present on only pereopods I and II 2.
- Body pubescent. Movable spine on distal end of merus present on pereopods I, II, and III *A. virilis* (Bate), 1881.
2. Pleurobranchiae on pereopods I to IV in form of papillae 1 to 2 mm in size, covered with small setae or spinules 3.
- Pleurobranchiae on pereopods I to IV very small, visible only with the help of a magnifying lens, and without spinules or setae *A. alcocki* Ramadan, 1938.
3. Inner lobe of petasma with a deep incision 4.
- Inner lobe of petasma without deep incision 5.
4. Chela of pereopods I and II longer than carpus (Figure 65) *A. varidens* Holthuis, 1952.
- 49 — Chela of pereopod I equal in length to carpus; chela of pereopod II shorter than carpus *A. semidentatus* Bate, 1881

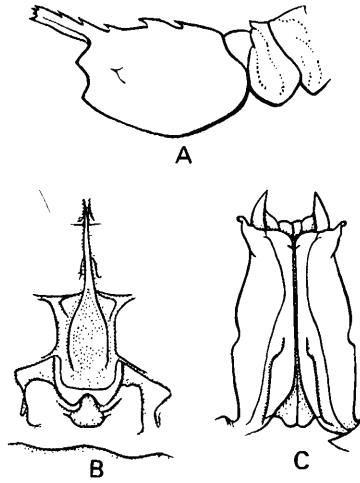
5. Usually, no spine present on posterior margin of abdominal somite6.
 — Small spine present on posterior margin of abdominal somite
*A. antennatus* (Risso), 1816.
6. Species not found in Atlantic Ocean7.
 — Species found in Caribbean Sea*A. antillensis* Bouvier, 1909.
7. Species found in Indian Ocean
*A. mabahisse* Ramadan, 1938.
 — Species found in region of Galapagos Islands
*A. occidentalis* Faxon, 1893.

Subfamily SICYONINAE Ortmann, 1890
 One genus: *Sicyonia* H. Milne-Edwards, 1830

KEY TO SPECIES FROM PACIFIC COAST OF AMERICA AND
 ATLANTIC OCEAN² (FROM ANDERSON AND LINDNER, 1945, WITH
 ADDITIONS)

1. Species inhabits Pacific and Atlantic coasts of America.2.
 — Species found off coast of West Africa and *S. carinata* found in
 Mediterranean Sea18.
2. Species inhabits Atlantic coast of America3.
 — Species inhabits Pacific coast of America9.
3. Antennal angle unarmed. Dorsal carina of abdominal somite II
 with an incision in the form of a transverse groove at place of joint.
 Dorsal carina of abdominal somite V does not terminate posteriorly
 in a tooth or sharp angle. Basis and ischium of pereopod I armed
 with spines4.
 — Antennal angle armed with buttressed spine. Dorsal carina of ab-
 dominal somite II without transverse groove. Dorsal carina of ab-
 dominal somite V terminates posteriorly in a tooth or sharp angle.
 Basis and ischium of pereopod I unarmed5.
4. Dorsal carina of carapace armed with three teeth posterior to orbital
 margin; middle tooth largest. Anterior tooth smaller than two post-
 erior ones and subequal to rostral teeth, but appears to be one of
 rostral group. Two subapical teeth on rostrum. Terminal margin of
 rostrum with four teeth. One or two small movable spines present on
 ventrodistal end of rostrum. Species inhabits Pacific and Atlantic
 coasts of America (Figure 66)*S. laevigata* Stimpson, 1871.
- 50 — Dorsal carina of carapace armed with three subequal teeth posterior
 to orbital margin; anterior tooth much larger than rostral teeth.
 Three teeth on rostrum. Terminal margin of rostrum armed with

²Key to species from the Indo-Pacific regions taken from Ya. I. Starobogatov (1972).



49

Figure 66. *Sicyonia laevigata* Stimpson (from Williams, 1965).
 A—cephalothorax (lateral view); B—thelycum; C—petasma.

three formed teeth and a fourth rudimentary one. No movable spines on ventrodistal end of rostrum (Figure 67)
 *S. parri* (Burkenroad), 1934.

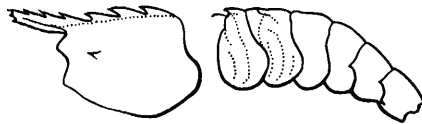


Figure 67. *Sicyonia parri* (Burkenroad) (from Williams, 1965).

- 5. Postrostral carina with two to three teeth posterior to orbital margin6.
- Postrostral carina with three to four teeth posterior to orbital margin; two larger located far behind orbit. Species inhabits Atlantic and Pacific coasts of America (Figure 68)
 *S. brevirostris* Stimpson, 1871.
- 6. Postrostral carina with one large tooth posterior to level of hepatic spine7.
- Postrostral carina with two large teeth posterior to orbital margin
 *S. edwardsii* Miers, 1881.
- 7. Rostrum inclined upward at a considerable angle8.
- Rostrum horizontal or slightly decurved at tip (Figure 69)
 *S. dorsalis* Kingsley, 1878.
- 8. Anteroventral angles of first four pleura of abdomen terminate in

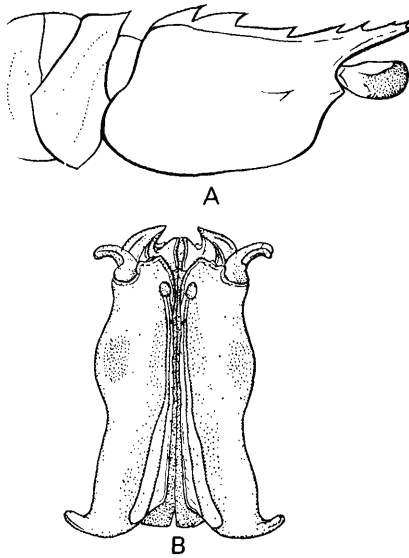


Figure 68. *Sicyonia brevirostris* Stimpson (from Williams, 1965).

A—cephalothorax (lateral view); B—petasma.

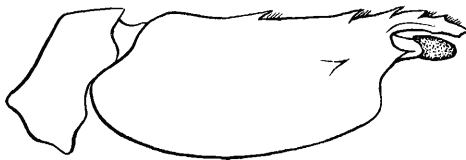


Figure 69. *Sicyonia dorsalis* Kingsley (from Williams, 1965).

- sharp spines curved laterally and slightly upward. Posterior angles of dorsal carinae of last three somites of abdomen taper into distinct spines *S. burkenroadi* Cobb, 1971.
- Anteroventral angles of first four pleura of abdomen without curved spines. Small backwardly directed teeth present on posterior margin of only last two somites of abdomen (Figure 70) *S. stimpsoni* Bouvier, 1905.
9. Antennal angle unarmed. Dorsal carina of abdominal somite II with an incision at place of joint in form of transverse groove. Dorsal carina of abdominal somite V does not terminate posteriorly in teeth or sharp angle. Basis and ischium of pereopod I armed with spines 10.
- Antennal angle armed with spines. Dorsal carina of abdominal somite II without transverse groove. Dorsal carina of abdominal



Figure 70. *Sicyonia stimpsoni* Bouvier (from Williams, 1965).

- somite V terminates posteriorly in a tooth or sharp angle. Basis and ischium of pereopod I unarmed 11.
10. *Dorsal carina of carapace armed with three teeth posterior to orbital margin; middle tooth largest. Anterior tooth smaller than two posterior ones and subequal to rostral teeth, but appears to be one of rostral group. Two subapical teeth on rostrum. Terminal margin of rostrum with four teeth. One or two small movable spines present on ventrodistal end of rostrum. Species inhabits Pacific and Atlantic coasts of America (Figure 66)
- *S. laevigata* Stimpson, 1871.
- Dorsal carina of carapace with three teeth posterior to orbital margin, all approximately equal in size. Anterior tooth larger than teeth of rostral group. Three teeth (excluding terminal ones) on rostrum. Terminal margin of rostrum armed with four to five teeth. Ventral margin of rostrum with one movable spine
- *S. disparri* (Burkenroad), 1934.
11. **Postrostral carina with two to three teeth posterior to orbital margin 12.
- Postrostral carina with three to four teeth posterior to orbital margin; three larger located far behind orbit. Species inhabits Pacific and Atlantic coasts of America (Figure 68)
- *S. brevirostris* Stimpson, 1871.
12. Two larger teeth of two to three on postrostral carina located posterior to orbit 13.
- Of two teeth on postrostral carina, larger located posterior to level of hepatic spine 14.
13. Rostrum with two teeth posterior to bifid tip (excluding anterior tooth of carapace sometimes located anterior to orbital margin). Pair of median acicules on orbital somite divergent and with distinctly curved tips *S. disedwardsi* (Burkenroad).
- Rostrum with one tooth posterior to bifid tip. Pair of median acicules

*Description same as under pt. 4 in the Russian original—General Editor.

**A repetition of pt. 5 in the Russian original—General Editor.

- on orbital somite, if curved, very slightly so
*S. penicillata* Lockington, 1878.
14. Posterior tooth on carapace very large and very close to posterior margin, merging with it like a high carina15.
 — Posterior tooth on carapace larger than anterior one, but not very strong and located far ahead of posterior margin16.
15. Pleura of abdominal somite I with small and short anteromedian groove. Abdominal surface smooth, although covered with dots and bristles*S. affinis* (Faxon), 1893.
 — Pleura of abdominal somite I with a deep anteromedian groove which extends to ventral margin and joins posteromedian groove. Abdominal surface tuberculate and fairly rugulose
*S. alliaffinis* (Burkenroad).
16. Dorsal carina posterior to last tooth on carapace low but distinct. Rostrum horizontal with three teeth with bifid and slightly decurved tip17.
 — Dorsal carina posterior to last tooth on carapace very high. Rostrum elevated at a considerable angle with four teeth above and two on terminal margin*S. picta* (Faxon), 1893.
17. Telson longer than uropods and armed with pair of well-defined immovable lateral spines. Rostrum with lateral crests parallel to ventral margin throughout its length*S. ingentis* (Burkenroad).
 — Telson shorter than uropods and armed with pair of very small, barely noticeable, immovable lateral spines. Rostrum with lateral crests raised upward from ventral margin toward distal end
*S. disdorsalis* (Burkenroad).
18. Sharp tooth present on pleura of abdominal somite V on lower side19.
 — No teeth on pleura of first five abdominal somites
*S. carinata* (Brünnich), 1768.
19. Anterior third of dorsal carina of abdominal somite II with a depression. Pleura of abdominal somite IV with tooth on lower side. Pereopod II with basial spine*S. galeata* Holthuis, 1952.
 — Anterior third of dorsal carina of abdominal somite II without depression. Pleura of abdominal somite IV without tooth on lower side. Pereopod II without basial spine*S. foresti* Rossignol.

Tribe Caridea Dana, 1852 (-Eucyphidea)

KEY TO FAMILIES (HOLTHUIS, 1955, WITH ADDITIONS)

1. Pereopods I and II, or only II, chelate or subchelate. Maxilliped III four- or five-segmented. Epipods, when present, small and extend vertically, not reaching branchial chamber2.

- Pereopods never chelate or subchelate. Maxilliped III seven-segmented. Epipods of first four pereopods very large, forming right angle and extending dorsally into branchial chamber (Figure 71) Family **Procarididae** only genus and species: *Procaris ascensionis* (Chace and Manning, 1972).
- 2. Pereopod I chelate or simple (nonchelate) 3.
- Pereopod I subchelate 21.
- 3. Fingers of all four chelae slender, with pectinate cutting edges Family **Pasiphaeidae**.
- Fingers of all four chelae with nonpectinate cutting edges 4.
- 4. Carpus of pereopod II entire (undivided). Pereopod I always with well-developed chela 5.
- Carpus of pereopod II usually divided into two or more subsegments. If not, pereopod I nonchelate 15.
- 53 5. Last two segments of maxilliped II placed side by side at end of preceding segment. Fingers of chelae extremely long and slender Family **Stylodactylidae** (only genus: *Stylodactylus* A. Milne-Edwards, 1881).
- Last two segments of maxilliped II not placed side by side at end of preceding segment. Fingers of chelae not very long 6.
- 6. Both fingers of chelae of pereopod I movable Family **Psalidopodidae** (only genus: *Psalidopus* Wood-Mason and Alcock, 1892).
- Only one finger on chelae of pereopod I movable 7.
- 7. Pereopod I stouter and stronger, although frequently slightly shorter than pereopod II 8.
- Pereopod I usually slender, rarely almost as thick as pereopod II 10.
- 8. Pereopod I with a flat, semicircular movable finger deeply hidden in slit of propodus when chelae closed. Rostrum dorsoventrally flat Family **Disciidae** (only genus: *Discias* Rathbun, 1902).
- Pereopod I with normal chelae. Rostrum laterally compressed . . 9.
- 9. Last segment of maxilliped II located along lateral side of penulti-

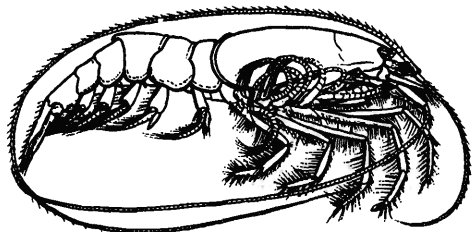


Figure 71. *Procaris ascensionis* Chace and Manning (Chace and Manning, 1972).

- mate segment. Exopod of maxilliped I with a well-developed flagellum Family **Rhynchocinetidae**.
- Last segment of maxilliped II located at end of penultimate segment. Exposed of mailliped I without flagellum Family **Bresiliidae**.
10. Pereopods usually with exopods. If exopods absent, fingers of chelae with terminal tufts of long hairs11.
- Pereopods without exopods. Fingers of chelae without terminal tufts of long hairs13.
11. Mandibles without palpi. Fingers of chelae usually with well-developed terminal tufts of hairs. Last three pairs of pereopods slightly elongated. Pereopods with or without exopods. Mostly inhabit fresh watersFamily **Atyidae**.
- Mandibles with palpi. Fingers of chelae without terminal tufts of hairs. Pereopods with exopods. Mostly inhabit deep seas12.
12. Last three pairs of pereopods not elongated, with carpus shorter than propodusFamily **Oplophoridae**.
- Last three pairs of pereopods considerably elongated, with carpus several times longer than propodus (Figure 72) Family **Nematocarcinidae**
(only genus: *Nematocarcinus* A. Milne-Edwards, 1881).
13. Arthrobranchiae and epipods present on first four pairs of pereopods. Upper antennular flagellum simple Family **Campylonotidae**.
- Pereopods without arthrobranchiae or epipods. Upper antennular flagellum divided into two14.
14. Mandibles usually with incisorial process; if not, maxilliped III not flat and foliateFamily **Palaemonidae**.
- Mandibles without incisorial process; maxilliped III flat and foliateFamily **Gnathophyllidae**.
- i5. Chelae of first pair of pereopods moderately well developed, at least on one side16.
- Chelae of first pair of pereopods microscopically small or absent19.

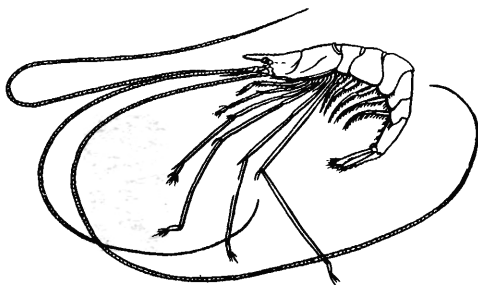


Figure 72. *Nematocarcinus ensifer*
(Smith).

16. Both pereopod I chelate. Rostrum dentate or edentate, without subdistal teeth17.
 — Usually first right pereopod chelate, while left simple with claw-like dactyl. If both first pereopods chelate, rostrum with distal notch covered with bristles and forming subdistal dorsal tooth
Family **Processidae**.
17. Tips of fingers of chelae of pereopod I usually brightly colored. First pair of chelipeds short and slightly stronger. Eyes free and never extremely elongated Family **Hippolytidae**.
 — Tips of fingers of chelae of pereopod I not brightly colored. Eyes extremely elongated or covered by carapace18.
18. Eyes extremely elongated, reaching almost to end of antennular peduncle; cornea small. Pereopod I shorter and not stronger than pereopod IIFamily **Ogyrididae**
 (only genus: *Ogyrides* Stebbing, 1914).
 — Eyes normal or partly or totally covered by carapace, and never elongated. Pereopod I significantly larger than pereopod II and often unequal in sizeFamily **Alpheidae**.
19. Carpus of pereopod II not divided into subsegments. Chelae of pereopod II strongFamily **Thalassocarididae**
 (only genus: *Thalassocaris* Stimpson, 1860).
 — Carpus of pereopod II divided into two or more subsegments. Chelae of pereopod II small20.
20. Mandibles with very well developed incisorial and molar processes and palpus. Rostrum laterally compressed and armed with teeth ..
Family **Pandalidae**.
 — Mandibles simple, without palpus. Rostrum broad and constitutes a continuation of carapace; several dorsal teeth on rostrum
Family **Physetocarididae**
 (only genus: *Physetocaris* Chace, 1940).
21. Carpus of pereopod II multisegmented
Family **Glyphocrangonidae**
 (only genus: *Glyphocrangon* A. Milne-Edwards, 1881).
 — Carpus of pereopod II nonsegmentedFamily **Crangonidae**.

FAMILY OPLOPHORIDAE KINGSLEY, 1878

KEY TO GENERA (FROM HOLTHUIS, 1955)

1. Exopods, at least on maxilliped III and pereopod I, foliate and usually hard. Outer margin of scophocerite usually armed with a series of spines. Telson terminates in a point. Eyes large and well pigmented (Figure 73)*Oplophorus* H. Milne-Edwards, 1837.
 — Exopods never foliate and hard on pereopods2.

- 2. At least last four abdominal somites with one dorsomedian carina each 3.
- Abdominal somite VI without dorsal carina 5.
- 55 3. Straight lateral carina of carapace absent. Posterior margin of hepatic groove not intersected by a sharp oblique outgrowth or carina. Entire cutting edge of mandible dentate (Figure 74)
 *AcanthePHYra* A. Milne-Edwards, 1881.

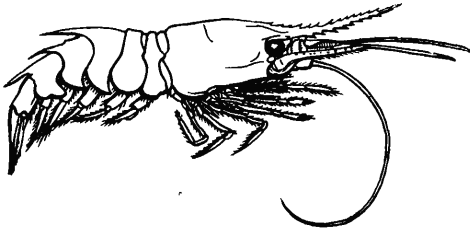


Figure 73. *Ophlophorus spinosus* (Brullé) (from Holthuis, 1955).

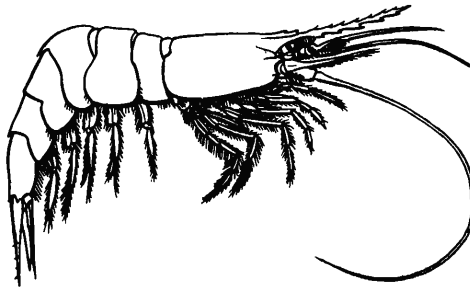


Figure 74. *AcanthePHYra purpurea* A. Milne-Edwards (from Holthuis, 1955).

- Carapace with at least one straight lateral carina extending from posterior margin to carapace. Posterior margin of hepatic groove sharply intersected at branchial part of carapace by an oblique carina. Anterior half of incisorial process of mandible unarmed . . 4.
- 4. Single longitudinal carina present on lateral surface of carapace. Dorsal carina of carapace edentate on posterior three-fourths of its length. No dorsal keel on abdominal somite I (Figure 77)
 *Meningodora* Smith, 1882.
- More than one longitudinal carina on lateral surface of carapace. Dorsal carina of carapace dentate throughout almost its entire length. Each abdominal somite with a dorsal carina (Figure 76) . . .
 *Notostomus* A. Milne-Edwards, 1881.
- 5. Ischium and merus of pereopods broad and slightly compressed laterally (Figure 75) *Ephyrina* Smith, 1885.
- Pereopods normal 6.
- 6. Eyes very small and poorly pigmented. Anterior margin of abdominal somite I flat and not serrated. Telson with incised and spiny end

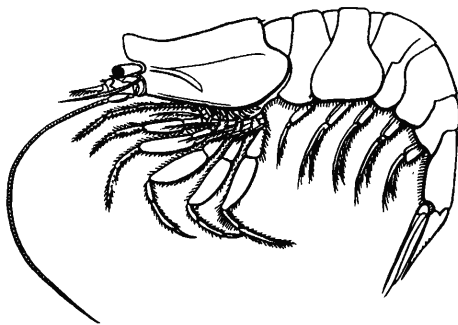


Figure 75. *Ephyrina hoskyni*
Wood-Mason and Alcock (from
Holthuis, 1955)

- (Figure 78) *Hymenodora* Sars, 1877.
— Eyes very large and well pigmented. Anterior margin of abdominal
56 somite I with distinct projection or teeth, which cover posterior
margin of carapace. Telson terminates in a sharply pointed tip and
is armed with lateral spines (Figure 79) *Systellaspis* Bate, 1888.

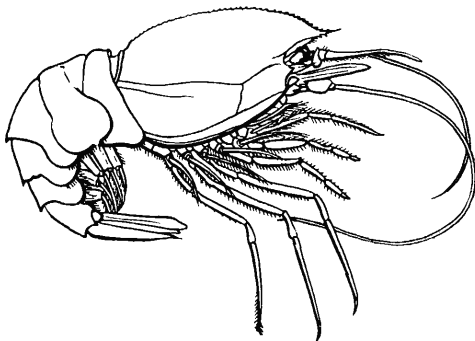


Figure 76. *Notostomus robustus*
Smith (from Holthuis, 1955).

FAMILY ATYIDAE DANA, 1852

KEY TO GENERA (FROM HOLTHUIS, 1955, WITH ADDITIONS)

1. Arthrobranchiae present on first four pereopods. Chelae without tufts of long hairs on finger tips (Figure 80).....
..... *Xiphocaris* van Martens, 1872.
- 57 — Arthrobranchiae absent, at least on last four pereopods. Chelae with tufts of long hairs on finger tips2.
2. Supraorbital spines present3.
- Supraorbital spines absent8.
3. Carapace without pterygostomial spine4.
- Carapace with pterygostomial spine6.
4. All pereopods with exopods. Eyes well developed, cornea pigmented (Figure 81) *Paratya* Miers, 1872.

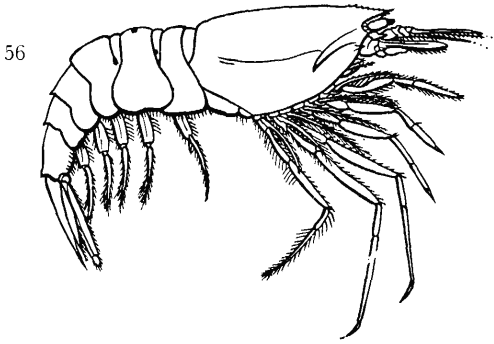


Figure 77. *Meningodora mollis*
Smith (from Holthuis, 1955).

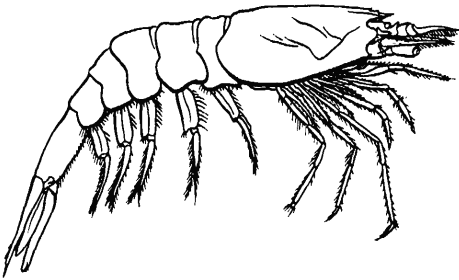


Figure 78. *Hymenodora gracilis*
Smith (from Holthuis, 1955).

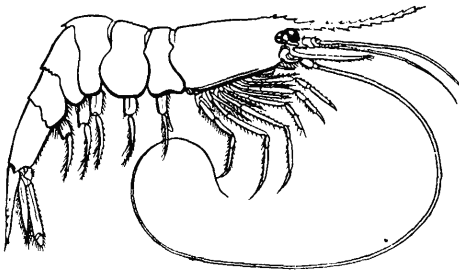


Figure 79. *Systellaspis debilis* (A.
Milne-Edwards) (from Holthuis,
1955).

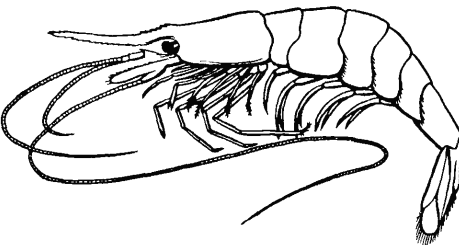


Figure 80. *Xiphocaris elongata*
(Guérin-Meneville).

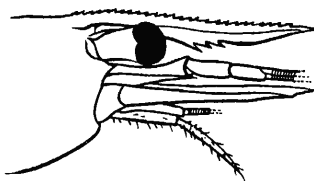


Figure 81. *Paratya compressa* (de Haan).

- Fifth pair of pereopods without exopods; if exopods present, eyes reduced and without pigment5.
- 5. Eyes much reduced and without pigment. In adults exopods present on first four or on all pereopods. Maxilliped III with arthrobranchiae (Figure 82)*Troglocaris* Dormitzer, 1853.
- Eyes well developed and pigmented. In adults exopods absent on pereopods. Maxilliped III without arthrobranchiae (Figure 83) . . .
.....*Atyaephyra* de Brito Capello, 1867.

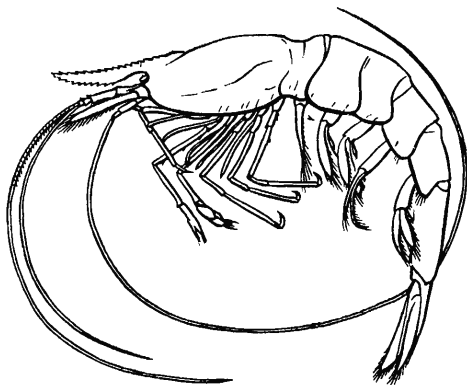


Figure 82. *Troglocaris anophthalmus* (Kollar) (from Holthuis, 1955).

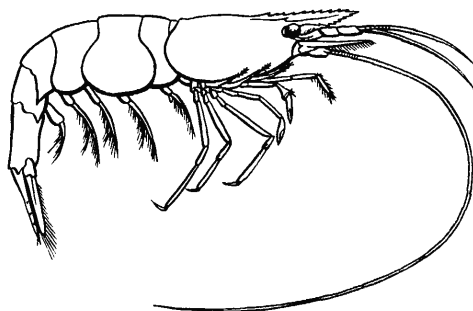


Figure 83. *Atyaephyra desmaresti* (Millet) (from Holthuis, 1955).

- 6. Carpus of first pereopod excavated but that of second normal. Pereopod V without exopod*Syncaris* Holmes, 1900.
- Carpus of both first and second pereopods excavated. Pereopod V usually with rudimentary exopod7.

7. Eyes much reduced and without pigment (Figure 84, *B*)
 *Palaemonias* Hay, 1901.
 — Eyes well developed and pigmented (Figure 84, *C*)
 *Dugastella* Bouvier, 1912.
8. Exopods present on all pereopods. Eyes reduced and without pigment or with slightly pigmented cornea 9.
 — Exopods absent, at least on last four pereopods. Eyes usually well developed and pigmented 12.
- 58 9. Antennal spine present 10.
 Antennal spine absent (Figure 84, *G*) *Typhlatya* Creaser, 1936.
10. Shrimps found off Madagascar and Australia 11.
 — Shrimps found off Fiji Island (Figure 84, *D* to *F*)
 *Antecaridina* Edmondson, 1954—(*Mesocaris* Edmondson, 1935).
11. Podobranchia present on maxilliped II. Epipod present on pereopod IV. Shrimps found off Australia
 *Stygiocaris* Holthuis, 1960.

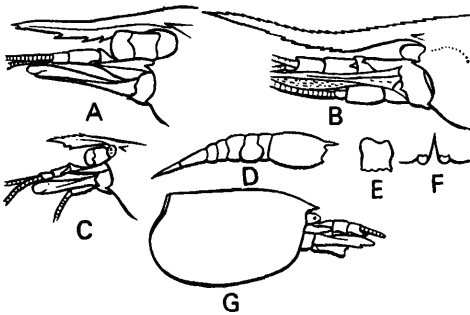


Figure 84. *A*—*Syncaris pasadenae* (Kingsley); *B*—*Palaemonias ganteri* Hay; *C*—*Dugastella marocana* Bouvier; *D*—*Antecaridina lauensis* (Edmondson) (lateral view); *E*—eye; *F*—rostrum (dorsal view); *G*—*Typhlatya garciai* Chace (from Holthuis, 1955).

- Podobranchia absent on maxilliped II. Epipod absent on pereopod IV. Shrimps found off Madagascar *Typhlopatsa* Holthuis, 1956.
12. Pereopod I with arthrobranchiae 13.
 — Pereopod I without arthrobranchiae 16.
13. Carpus of pereopod II very short, width greater than length, and deeply excavated anteriorly (Figure 85) *Atya* Leach, 1816.
 — Carpus of pereopod II greater in length than width and not deeply

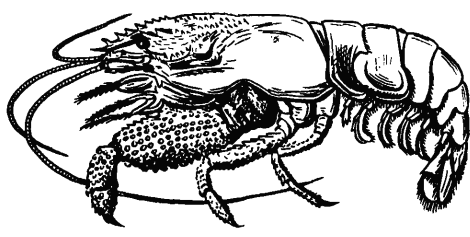


Figure 85. *Atya crassa* (Smith) (from Holthuis, 1955).

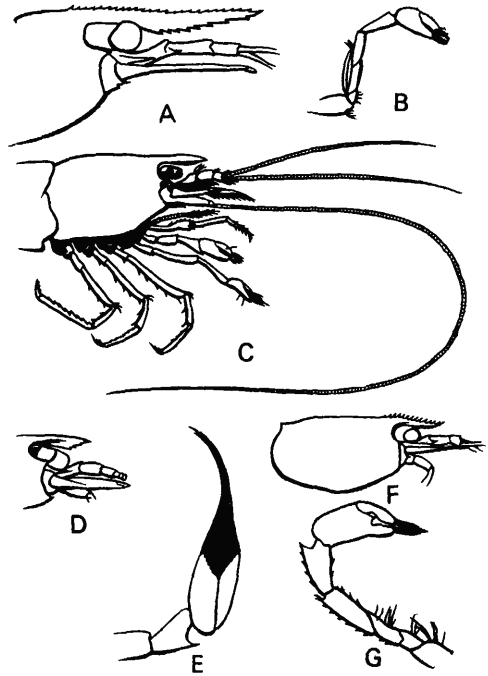


Figure 86. *Caridinides wilkinsi* Calman: A—anterior end; B—pereopod I; *Caridina acuminata* Stimpson: C—anterior end; *Potimirim mexicana* (De Sausure): D—cephalic end; E—first chela; *Caridella cunnigtoni* Calman: F—anterior end; G—first chela (from Holthuis, 1955).

- excavated anteriorly14.
- 59 14. Exopod present on pereopod I (Figure 86, A and B)
*Caridinides* Calman, 1936.*
- Pereopod I without exopod15.
15. Palmar portion of chela well developed. Fingers of chela slightly longer than propodus. Rostrum usually laterally compressed and dentate on both upper and lower margins; rarely one or both margins unarmed. Carpus of pereopod II, if anteriorly excavated, very small. Area of generic distribution: Africa and Indo-West-Pacific region (Figure 86, C). . . .*Caridina* H. Milne-Edwards, 1837.
- Palmar portion of chela very small. Fingers almost equal in length to propodus. Rostrum short, dorsoventrally compressed basally, and without dorsal (although with ventral) teeth. Carpus of pereopod II usually with well-developed anterior excavation. Area of generic distribution: America (Figure 86, D and E)
*Potimirim* Holthuis, 1954.
16. Carpus of pereopod I excavated anteriorly17.
- Carpus of pereopod I not excavated or slightly excavated anteriorly19.

*Mistake in original. Should read "Calman, 1926"—Technical Editor.

- 17. Palmar portion of chela indistinct. Chela divided up to or almost up to base so that fingers equal in length. Carpus of pereopod II with anterior excavation18.
- Palmar portion of chela distinct. Fingers distinctly shorter than propodus. Carpus of pereopod II without anterior excavation (see Figure 86, *F* and *G*)*Caridella* Calman, 1906.
- 18. Anterolateral angle of basal segment of antennular peduncle with slender tooth. Several postorbital teeth occur on upper margin of rostrum. Shrimps found in Lake Tanganyika (Figure 87, *A* and *B*)*Atyella* Calman, 1906.
- Anterolateral angle of basal segment of antennular peduncle without tooth. Postorbital teeth absent on upper margin of rostrum. Shrimps found off Cuba (Figure 87, *C* and *D*)
.....*Micratya* Bouvier, 1913.

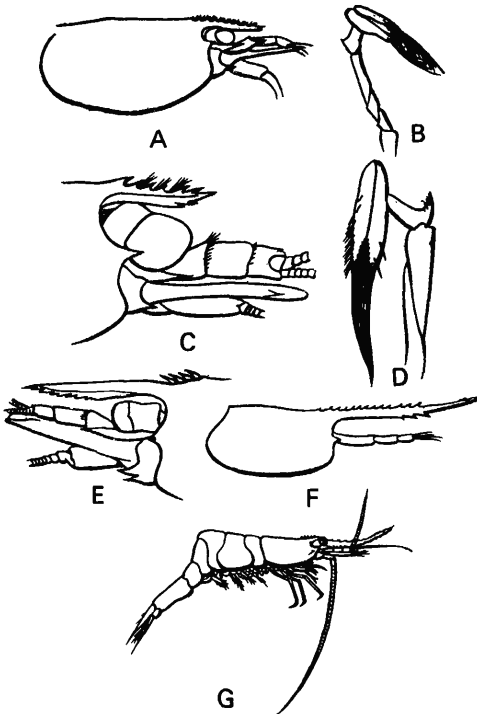


Figure 87. *Atyella brevirostris* Calman: *A*—anterior end; *B*—pereopod I; *Micratya poeyi* (Guerin): *C*—anterior end; *D*—pereopod I; *Caridinopsis chevalieri* Bouvier: *E*—anterior end; *Limnocaridella alberti* (Lenz): *F*—carapace; *G*—*Limnocaridina tanganyike* Calman (from Holthuis, 1955).

- 19. Epipods present on first four pereopods. All pereopods with pleurobranchiae. Maxilliped III with two arthrobranchiae; maxilliped II with podobranchiae. Rostrum quite long and upper margin devoid of teeth except for postorbitals (Figure 87, *E*)
.....*Caridinopsis* Bouvier, 1913.

- Epipods absent on first four pereopods. Pleurobranchiae on pereopod V usually absent. Maxilliped III largest with one arthrobranchia. Podobranchiae absent on maxilliped II. Upper margin of rostrum without postorbital teeth20.
- 20. Epipods present on first three pereopods. Rudimentary arthrobranchiae present on maxilliped III (Figure 87, F)
*Limnocaridella* Bouvier, 1913.
- Epipods absent on pereopods. Branchiae absent on maxilliped III (Figure 87, G).*Limnocardina* Calman, 1899.

FAMILY PASIPHAEIDAE DANA, 1852

KEY TO GENERA (FROM HOLTHUIS, 1955)

1. Mandibles without palpus. Rostrum represented by a raised post-frontal spine (Figure 88, A)*Pasiphaea* Savigny, 1816.
- Mandibles with palpus. Rostrum represented by forward projection of carapace2.
2. Pereopod IV distinctly shorter than pereopods III and V.3.
- Pereopod IV longer than pereopod V, but both shorter than pereopod III7.
3. Antennal and branchiostegal spines absent. Dorsal margin of carapace usually without spines4.
- Antennal and branchiostegal spines present. Dorsal margin of carapace with spines5.
4. Mandibular palpus two-segmented (Figure 88, B)
*Parapasiphae* Smith, 1884.

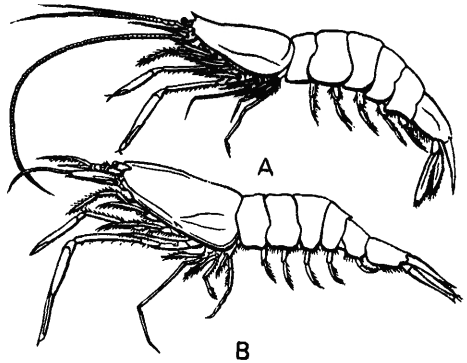


Figure 88. A—*Pasiphaea multidentata* Esmark; B—*Parapasiphae sulcatifrons* (from Holthuis, 1955).

- Mandibular palpus unsegmented (Figure 89, A and B)
*Dantecia* Caullery, 1896.
- 5. Mandibular palpus unsegmented (Figure 89, C)
*Sympasiphaea* Alcock, 1901.

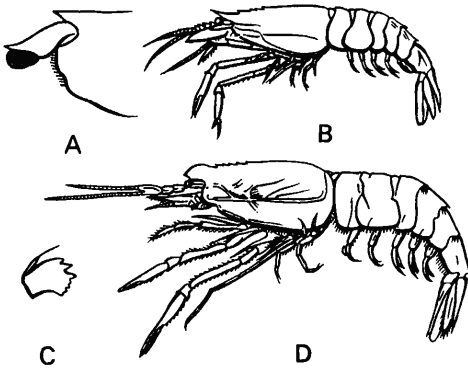


Figure 89. *Dantecia caudani* Caulery: A—anterior part of carapace; B—mandible; C—*Sympasiphaea annectens* Alcock; D—*Eupasiphae latirostris* (Wood-Mason and Alcock) (from Holthuis, 1955).

- Mandibular palpus two-segmented 6.
- 6. Maxilliped III with one arthrobranchia *Glyphus* Filhol, 1884.
- Maxilliped III with two arthrobranchiae (Figure 89, D).
 *Eupasiphae* Wood-Mason and Alcock, 1893.
- 61 7. Pereopods III and IV almost equal in length, slender, and not shorter than pereopod I. Pleopods with very long and narrow exopods. Endopods distinctly shorter. Rostrum with dorsal teeth (Figure 90, A) *Psathyrocaris* Wood-Mason and Alcock, 1893.
- Pereopod IV shorter than pereopod III, and both shorter than pereopod I. Pleopods with short and equally long endopods and exopods. Rostrum without dorsal teeth (see Figure 90, B)
 *Leptochela* Stimpson, 1860.

FAMILY RHYNCHOCINETIDAE ORTMANN, 1890

KEY TO GENERA (FROM YALDWYN, 1960)

- 1. Rostrum immovable 2.
- Rostrum movable (Figure 91)
 *Rhynchocinetus* H. Milne-Edwards, 1837.
- 2. Finger tips of pereopods I and II brightly pigmented (Figure 92) . .
 *Eugonatonotus* Schmitt, 1926.
- Finger tips of pereopods I and II not brightly pigmented
 *Lipkius* Yaldwyn, 1960.

FAMILY BRESILIIDAE CALMAN, 1896

KEY TO GENERA (FROM HOLTHUIS, 1955)

- 1. Exopods present only on first two pairs of pereopods. Pereopod V with a rudimentary pleurobranchia (Figure 93, A)

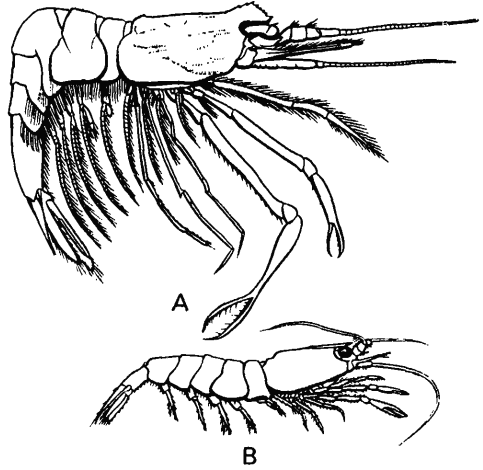


Figure 90. A—*Psathyrocaris infirma* Alcock and Anderson; B—*Leptochela bermudensis* Gurney (from Holthuis, 1955).

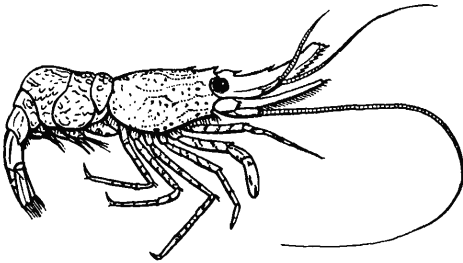


Figure 91. *Rhynchocinetus typus* H. Milne-Edwards (from Holthuis, 1955).

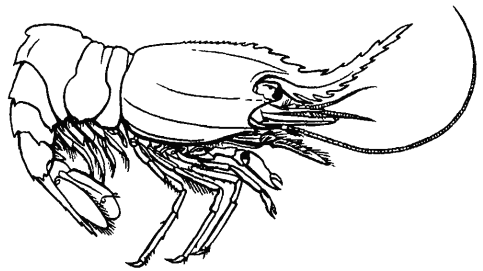


Figure 92. *Eugonatonotus crassus* (A. Milne-Edwards) (from Holthuis, 1955).

.....*Bresilia* Calman, 1896.
 — Exopods present on all pereopods. Pereopod V with a well-developed pleurobranchia (Figure 93, B)*Lucaya* Chace, 1939.

1. Pereopods II similar. Basal part of rostrum with no more than five

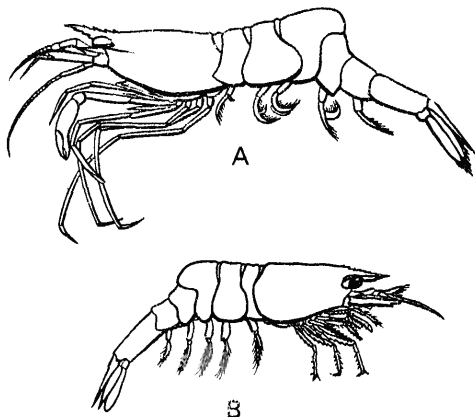


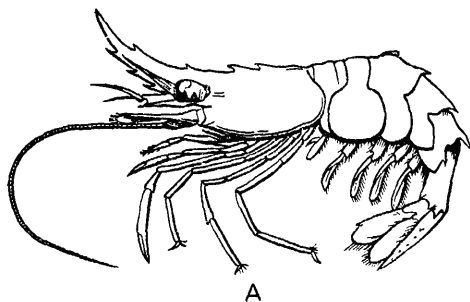
Figure 93. A—*Bresilia atlantica* Calman; B—*Lucaya bigelowi* Chace.

- teeth; first tooth situated behind midpoint of carapace (Figure 94, A) *Campylonotus* Bate, 1888.
- Pereopods II very dissimilar. Basal part of rostrum with more than 10 dorsal teeth, all of which are situated in anterior half of carapace (Figure 94, B) *Bathypalaemonella* Balss, 1914.

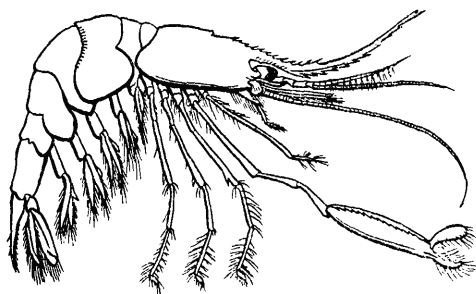
FAMILY PALAEMONIDAE SAMOUELLE, 1819

KEY TO SUBFAMILIES (FROM HOLTHUIS, 1955)

1. Upper antennular flagellum with two branches which are free throughout their length. Pleopod II in male without appendix masculina, and in female without appendix interna. Pleurobranchiae absent at base of maxilliped III Subfamily **Euryrhynchinae**
(only genus: *Euryrhynchus* Miers, 1877).
- Upper antennular flagellum with two branches which are basally fused. Pleopod II in male usually with appendix masculina and in female with appendix interna 2.
2. Lateral surface of carapace with longitudinal suture throughout its length, extending posteriorly from antennal region. Pleurobranchiae absent on maxilliped III. Subfamily **Typhlocaridinae**
(only genus: *Typhlocaris* Calman, 1909).
- Lateral surface of carapace without suture 3.
- 63 3. Pleurobranchiae absent on maxilliped III. Posterior margin of telson with three pairs of spines (except in *Anchistioides* which have fewer) Subfamily **Pontiinae**.
- Pleurobranchiae present at base of maxilliped III. Posterior margin of telson with two pairs of spines and two or more setae Subfamily **Palaemoninae**.

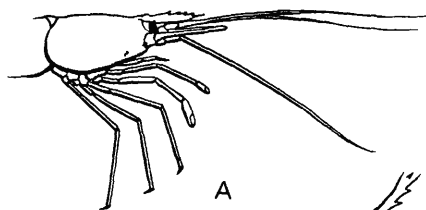


A

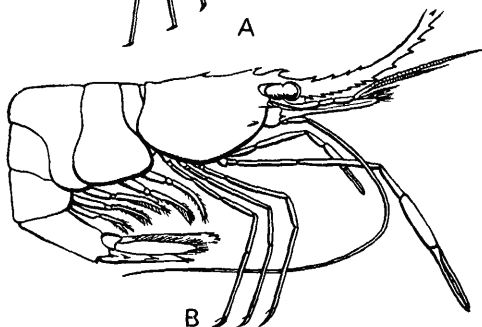


B

62 Figure 94. A—*Camphylonotus rathbunae* Schmitt; B—*Bathypalaemonella zummeri* Balss (from Holthuis, 1955).



A



B

Figure 95. A—*Desmocaris trispinosa* (Aurivillius); B—*Leander urocaridella* Holthuis (from Holthuis, 1955).

Subfamily PALAEMONINAE Dana, 1852

KEY TO GENERA (FROM HOLTHUIS, 1955)

1. Supraorbital spine present *Desmocaris* Sollaud, 1911.
- Supraorbital spine absent 2.



Figure 96. *A*—*Creaseria morleyi* (Creaser): cephalothorax; *B*—*Leandrites celebensis* (de Man): anterior part of cephalothorax (from Holthuis, 1955).

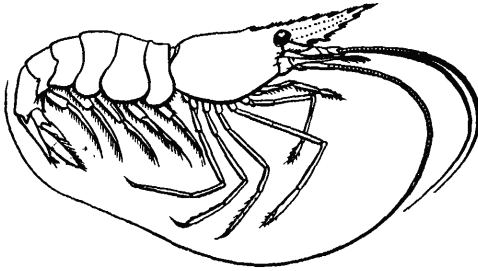
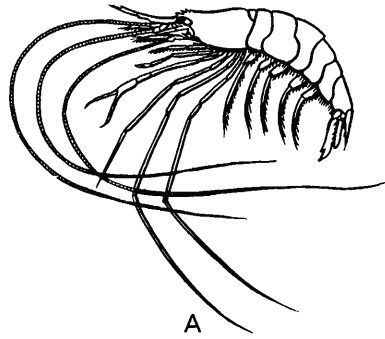
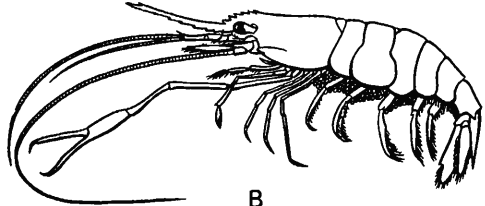


Figure 97. *Palaemon (Palaemon) longirostris* H. Milne-Edwards (from Holthuis, 1955).

2. Branchiostegal spine present3.
- Branchiostegal spine absent7.
3. Mandibles without palpus4.
- Mandibles with palpus5.
4. Pleopod I in male with distinct appendix interna on endopod. Branchiostegal groove absent. Propodus of pereopod V without transverse rows of setae on distal part of posterior margin (see Figure 96, *B*) *Leandrites* Holthuis, 1950.
- Pleopod I of male without appendix interna on endopod. Branchiostegal groove discernible as a sharp line. Propodus of pereopod V with transverse rows of setae on distal part of posterior margin *Palaemonetes* Heller, 1969.
- A. Eyes usually pigmented. Pereopod II stouter than pereopod I. Outer margin of exopod of uropod terminates in a tooth and a movable spine Subgenus *Palaemonetes* Heller, 1869.
- Eyes not pigmented. Pereopod II almost similar to pereopod I. Outer margin of exopod of uropod terminates in a tooth but not a movable spine Subgenus *Allocaris* Sollaud, 1911.
- 64 5. Eyes not pigmented, cornea reduced. Anterior margin of basal segment of antennular peduncle concave, gradually converging into a strong anterolateral spine. Branchiostegal groove on carapace absent. Propodus of pereopod V with transverse rows of hairs in distal part of posterior margin. Mandibular palpus two-segmented (Figure 96, *A*) *Creaseria* Holthuis, 1950.
- Eyes distinctly pigmented, cornea well developed. Anterior margin of basal segment of antennular peduncle rounded; anterolateral spine small6.
6. Pleopod I of male with well-developed appendix interna on endopod. Branchiostegal groove absent. Propodus of pereopod V



A



B

Figure 98. A—*Palaemon (Nematopalaemon) tenuipes* (Henderson);
B—*Palaemon (Exopalaemon) styliiferus* H. Milne-Edwards (from
Holthuis, 1955).

without transverse rows of setae on distal part of posterior margin. Two median setae on posterior margin of telson very strong. Mandibular palpus two-segmented (Figure 95, B)
.*Leander* Desmarest, 1849.

— Pleopod I of male without or with rudimentary appendix interna on endopod. Branchiostegal groove usually present as a sharp line. Propodus of pereopod V with transverse rows of setae on distal part of posterior margin. Two median setae on posterior margin of telson slender (Figure 97)*Palaemon* Weber, 1795.

A. Rostrum with a raised basal crest with teeth. Pleura of abdominal somite V with broad rounded tip. Mandibular palpus three-segmented**B.**

65

— Rostrum without a raised basal crest. Pleura of abdominal somite V usually with small pointed tip. Branchiostegal groove present**C.**

B. Dactyl of last three pereopods highly elongated, longer than carpus and propodus together. Branchiostegal groove absent on carapace. Stylocerite with large tooth on dorsal surface (Figure 98, A)Subgenus *Nematopalaemon* Holthuis, 1950.

— Dactyl of last three pereopods shorter than propodus. Branchiostegal groove present on carapace. Stylocerite without large dorsal tooth (Figure 98, B)
.Subgenus *Exopalaemon* Holthuis, 1950.

C. Mandibular palpus two-segmented (Figure 99, A)
.Subgenus *Palaeander* Holthuis, 1950.

- Mandibular palpus three-segmented (Figure 97) Subgenus *Palaemon* Weber, 1795.
- 7. Hepatic spine absent 8.
- Hepatic spine present 10.

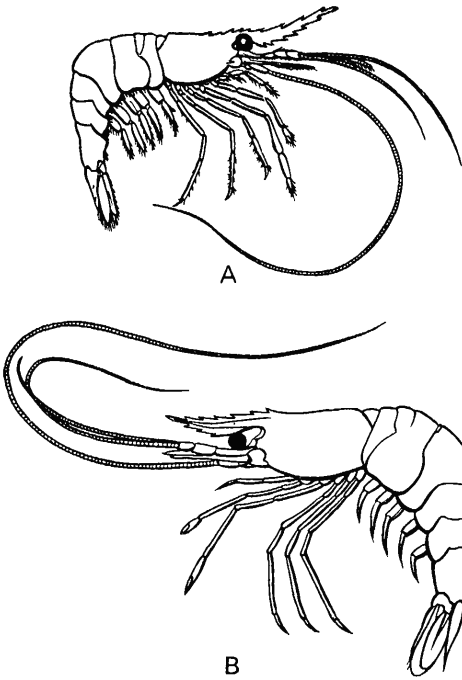
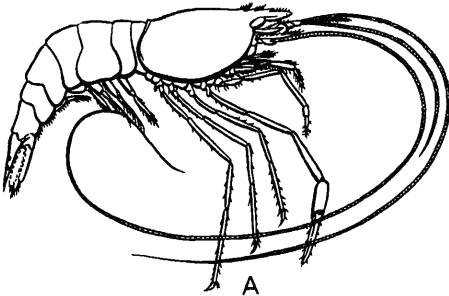
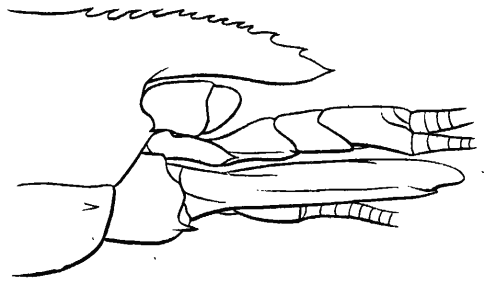


Figure 99. A—*Palaemon* (*Palaeander*) *floridanus* Chace; B—*Palaemonetes* (*Palaemonetes*) *kadiakensis* Rathbun (from Holthuis, 1955).

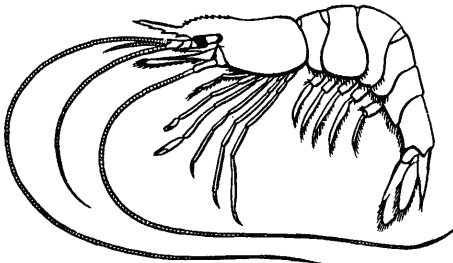
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- 8. Mandibles without palpus. Eyes not pigmented (Figure 101, A) *Troglocubanus* Holthuis, 1949.
- Mandibles with palpus. Eyes pigmented 9.
- 9. Pereopod II slender and smooth. Carpus 1.5 times or more longer than chela. Rostrum extends beyond scaphocerite (Figure 101, B) *Leptocarpus* Holthuis, 1950.
- Pereopod II robust and spinescent. Carpus less than half chela in length. Rostrum very short and high; does not extend beyond scaphocerite (Figure 102) *Cryphiops* Dana, 1852.
- 10. Mandibles without palpus. Dactyl of last three pereopods simple (Figure 103) *Pseudopalaemon* Sollaud, 1911.
- Mandibles with palpus 11.
- 11. Dactyl of last three pereopods simple (Figure 104, B) *Macrobrachium* Bate, 1868.
- Dactyl of last three pereopods biunguiculate (Figure 104, A) *Brachycarpus* Bate, 1888.

Figure 100. *Palaemonetes (Allocaris) antrorum* Benedict: anterior part of carapace (from Holthuis, 1955).



A



B

Figure 101. A—*Trogllocubanus gibarensis* (Chace); B—*Leptocarpus fluminicola* (Kemp) (from Holthuis, 1955).

Subfamily PONTONIINAE Kingsley, 1878

KEY TO GENERA (FROM HOLTHUIS, 1955, WITH ADDITIONS)

1. Mandibular palpus present2.
- Mandibular palpus absent3.
2. Hepatic spine present (Figure 105)*Palaemonella* Dana, 1852.
- Hepatic spine absent2a.
- 2a. Mandibular palpus two-segmented*Eupontonia* Bruce, 1971.
- Mandibular palpus one-segmented (Figure 105, B)
.....*Vir* Holthuis, 1952.
3. Scaphocerites well developed4.
- Scaphocerites rudimentary37.
4. Exopods present on all maxillipeds5.

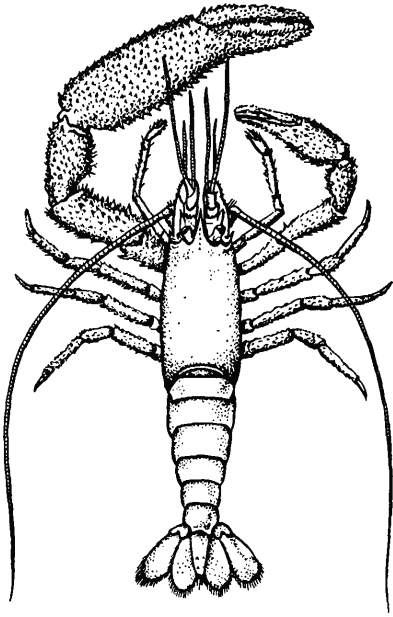
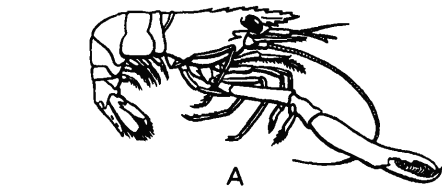
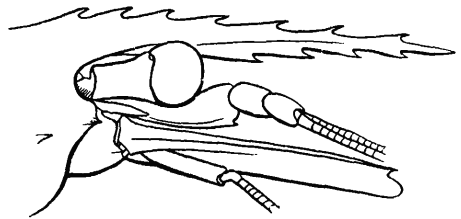
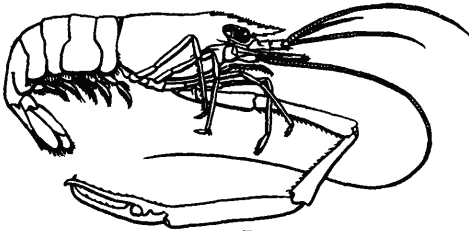


Figure 102. *Cryphiops caementarius* (Molina) (from Holthuis, 1955).

Figure 103. *Pseudopalaemon bouvieri* Sol্লাud: anterior part of carapace (from Holthuis, 1955).



A



B

Figure 104. A—*Brachycarpus biunguiculatus* (Lucas); B—*Macrobrachium lar* (Fabricius) (from Holthuis, 1955).

- Exopods absent, at least on maxilliped III27.
- 5. Dactyl of last three pereopods without basal projections. Sometimes dactyl broad at base, but broad part not seen when dactyl bent backward6.
- Dactyl of last three pereopods with distinct basal projections, which are visible even when dactyl bent backward22.
- 6. Pleura of first five abdominal segments broadly rounded or obtuse, but never with sharp points7.
- .67 — Pleura of at least abdominal segments IV and V with sharply pointed ends20.

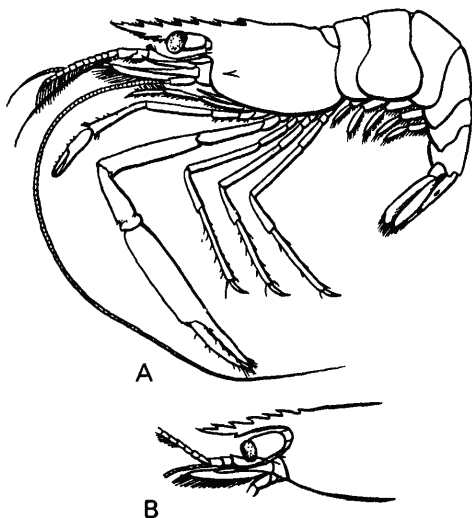


Figure 105. A—*Palaemonella vestigialis* Kemp; B—*Vir orientalis* (Dana): anterior end (from Holthuis, 1955).

- 7. Hepatic spine present8.
- Hepatic spine absent11.
- 8. Rostrum large, dorsally flat, with longitudinal median carina on ventral side, and looks like a “T” in cross section. Carapace with broad and distinct postorbital groove9.
- Rostrum laterally compressed, never dorsally flat, and does not look like a “T” in cross section. Postorbital groove, if present, narrow and indistinct10.
- 9. Three posterior pereopods consist of six segments only, since division of ischium and merus indistinct *Tuleariocaris* Chace, 1969.
- Three posterior pereopods distinctly divided into seven segments (Figure 106, A)*Stegopontonia* Nobili, 1906.
- 10. Hepatic spine immovable. Body in most cases slender. Rostrum with distinct teeth.*Periclimes* Costa, 1844.
 - a. Dactyl of last three pereopods biunguiculate (Figure 107, A) . . .

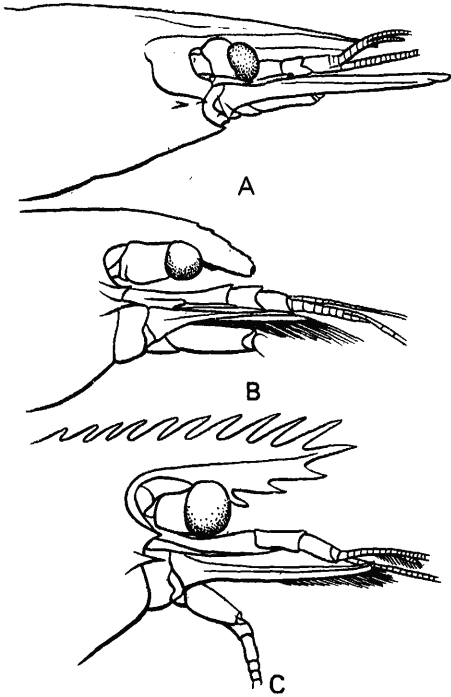


Figure 106. A—*Stegopontonia commensalis* Nobili: anterior part of carapace; B—*Paranchistus biunguiculatus* (Borradaile): anterior part of carapace; C—*Thaumastocaris streptopus* Kemp: anterior part of carapace (from Holthuis, 1955).

-Subgenus *Periclimes* Costa, 1844.
- Dactyl of last three pereopods simple (Figure 107, B)
-Subgenus *Harpilius* Dana, 1852.
- Hepatic spine immovable.* Body clumsy or heavy. Rostrum with small teeth arranged closer to its tip (Figure 106, B)
-*Paranchistus* Holthuis, 1952.
- 68 11. Rostrum laterally compressed, usually dentate12.
- Rostrum depressed³ or cylindrical, usually edentate19.
- 12. Carpus of pereopod I subsegmented. Pereopod I unequal (Figure 106, C)
-*Thaumastocaris* Kemp, 1922.
- Carpus of pereopod I nonsegmented. Pereopod I equal13.
- 13. Pereopod II very dissimilar in size and shape. Larger pereopod II very high, with short broad fingers with one to three teeth; one tooth hammer-shaped and lodged in cavity of opposite finger. Outer margin of basal antennular segment frequently anterior to stylocerite (Figure 108).
-*Periclimes* Borradaile, 1915.
- Pereopod II differ in shape,** sometimes more or less dissimilar in

³Here and elsewhere “depressed” conveys a dorsoventral direction and “compressed” a lateral.

*Error in original. Should read “hepatic spine movable”—Technical Editor.

**Error in original. Should read “Pereopod II similar in shape”—Technical Editor.

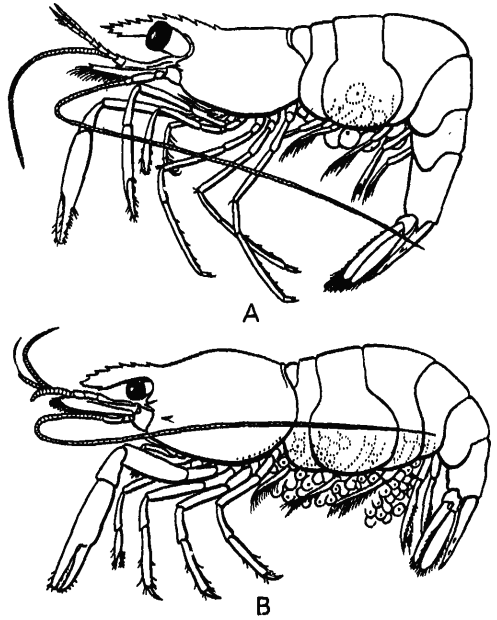


Figure 107. A—*Periclimes (Periclimes) impar* Kemp; B—*Periclimes (Harpilius) brevicarpus* (Schenkel) (from Holthuis, 1955).

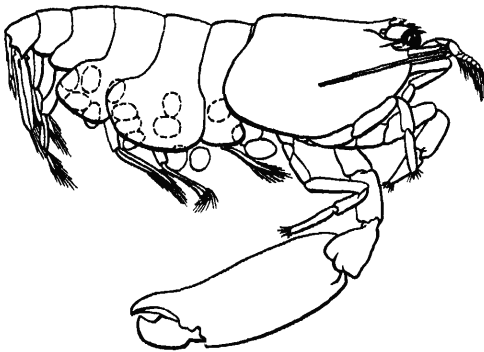


Figure 108. *Periclimes (Periclimes) tridentatus* (Miers) (from Holthuis, 1955).

- size. Fingers of these pereopods elongated, with small teeth, but sometimes without hammershaped one. Outer margin of basal antennular segment without lateral triangular projection14.
14. Rostrum very short, does not extend beyond eye stalk, and with or without very small teeth. Chelae of pereopod II high and somewhat compressed; fingers with one and two teeth (Figure 109)
*Onyccaris* Nobili, 1904.
- Rostrum extends beyond eye stalk and very often dentate. Chelae of pereopod II cylindrical and slightly broad; fingers with large number (more than three) of denticles15.
15. Scaphocerite broad and oval; terminal tooth does not extend beyond

- lamella16.
- Scaphocerite narrow and sharply pointed; terminal tooth extends beyond lamella17.
- 69 16. Telson with two large ventrally curved terminal spines.
.....*Hamopontonia* Bruce, 1970.
- Telson without these processes (Figure 110)
.....*Anchistus* Borradaile, 1898.

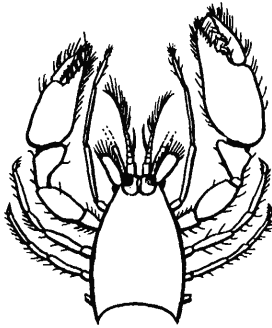


Figure 109. *Onycozoides quadratophthalma* (Bals): anterior part of body (dorsal view) (from Holthuis, 1955).

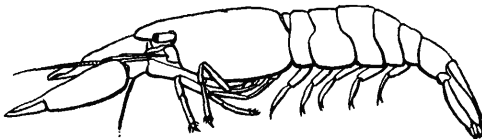


Figure 110. *Anchistus custos* (Forskäl) (from Holthuis, 1955).

- 17. Antennal spine present (Figure 111, A) ...*Philarius* Holthuis, 1952.
- Antennal spine absent18.
- 18. Body moderately compressed. Dorsal spine on telson absent. Lateral margin of exopod of uropod with numerous teeth
.....*Anapontonia* Bruce.
- Body very highly compressed. Dorsal spine present on telson and located on its distal third. Lateral margin of exopod of uropod armed with one large falcate spine.*Ischnopontonia* Bruce.
- 19. Telson rather broad; large dorsal spines usually present. Lateral margin of endopod* of uropod armed with one tooth20.
- 70 — Telson quite long; very small dorsal spines present. Outer margin of endopod* of uropod terminates in two spines; inner spine movable (Figure 112, A and B).*Pontoniopsis* Borradaile, 1915.
- 20. Maxilliped III without arthrobranchiae. Body not highly depressed. Dactyl on last three pereopods straight and usually with one or more accessory teeth behind tip (Figure 111, B and C)

*Error in original. Should read "exopod of uropod"—Technical Editor.

-*Pontonia* Latreille, 1829.
- Maxilliped III with arthrobranchiae. Body very highly depressed. Dactyl on last three pereopods simple and highly curved (Figure 112, *C* and *D*)*Platycaris* Holthuis, 1952.

69 Figure 111. *A*—*Philarius imperialis* (Kubo); *Pontonia pinnophyllax* (Otto): *B*—male; *C*—female (from Holthuis, 1955).

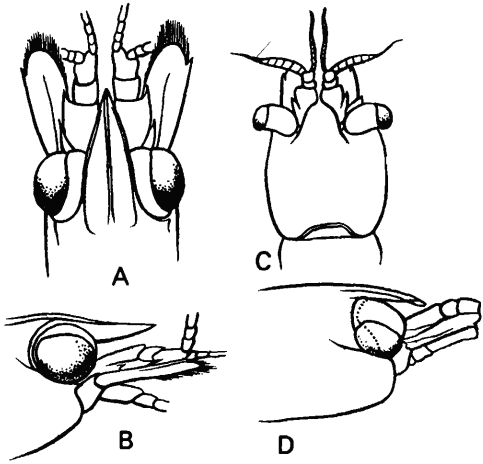
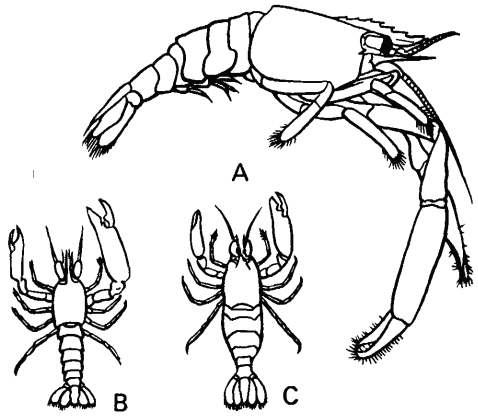


Figure 112. *Pontoniopsis comanthi* Borradaile, anterior end: *A*—dorsal view; *B*—lateral view; *Platycaris latirostris* Holthuis, anterior end: *C*—dorsal view; *D*—lateral view (from Holthuis, 1955).

- 21. Body clumsy and not depressed. Carapace and abdomen sculptured. Lower margin of rostrum entire. Pleura of third abdominal segment sharply pointed (Figure 113).....*Dasycaris* Kemp, 1922.
- Body highly depressed. Carapace and abdomen smooth. Lower margin of rostrum dentate. Pleura of third abdominal segment broadly rounded (Figure 114, *A*)....*Harpiliopsis* Borradaile, 1917.
- 22. Carapace with three to four spines behind antennal spine. Pereopod II with short, noncompressed fingers (Figure 114, *B*)
.....*Fennera* Holthuis, 1951.

- Carapace without spines, except antennal and hepatic ones. Pereopod II with laterally compressed fingers23.
- 23. Body highly depressed. Basal projections of last three pereopods unguulate. Rostrum usually dentate24.
- Body clumsy and not highly depressed. Basal projections of last



Figure 113. *Dasycares ceratops* Holthuis (from Holthuis, 1955).



Figure 114. A—*Harpiliopsis depressus* (Stimpson); anterior part of cephalothorax; B—*Fennera chacei* Holthuis; anterior part of cephalothorax (from Holthuis, 1955).

- three pereopods flat. Rostrum usually edentate25.
- 24. Hepatic spine absent. Pereopod II similar in shape although sometimes unequal in size (Figure 115, A)
.....*Coralliocaris* Stimpson, 1860.
- Hepatic spine present. Pereopod II very different in shape and size (Figure 115, B) *Jocaste* Holthuis, 1952.
- 25. Rostrum depressed and edentate. Antennal spine absent (Figure 116)*Conchodytes* Peters, 1852.
- Rostrum compressed. Antennal spine present26.
- 26. Rostrum edentate. Basal projections of dactyl of last three pereopods rounded and smooth. Maxilliped III with arthrobranchiae (Figure 115, C and D)*Dasella* Labour, 1945.
- Rostrum dentate. Basal projections of dactyl of last three pereopods sharply pointed with small ventral squamae. Maxilliped III without arthrobranchiae (Figure 117, A)*Cavicheles* Holthuis, 1952.
- 71 27. Pleura of first five abdominal segments broadly rounded or obtuse28.
- Pleura of at least abdominal segments IV and V distinctly pointed34.
- 28. Hepatic spine present29.
- Hepatic spine absent31.
- 29. Antennal spine present30.

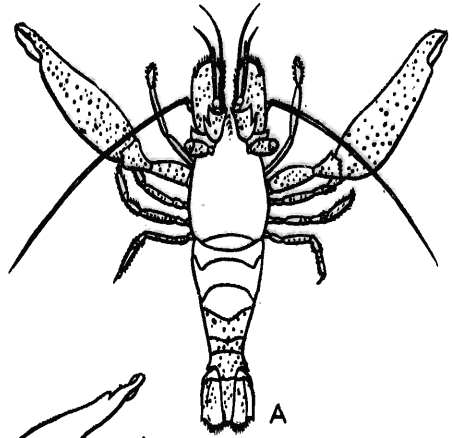


Figure 115. A—*Coralliocaris superba* (Dana); B—*Jocaste lucina* (Nobili); *Dasella herdmaniae* (Lebour): C—lateral view; D—chela of pereopod 11 (from Holthuis, 1955).

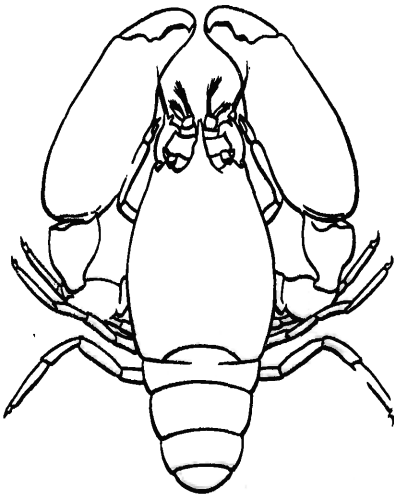


Figure 116. *Conchodytes monodactylus* Holthuis (from Holthuis, 1955).

- Antennal spine absent (Figure 117, *B*)*Waldola* Holthuis, 1951.
30. Exopod on maxilliped II absent (Figure 118)*Hamodactylus* Holthuis, 1952.
*Hamodactylus* Holthuis, 1952.
- Exopod on maxilliped II present*Propontonia* Bruce, 1969.
31. Maxilliped II with well-developed exopod. Dactyl of last three pereopods biunguiculate. Rostrum compressed and dentate. Post-orbital tubercle present (Figure 119)*Anchistioides* Paulson, 1875.
- Maxilliped II without exopod. Dactyl of last three pereopods simple. Rostrum depressed, at least in basal part. Postorbital tubercle absent32.
32. Rostrum depressed throughout length and without dorsal teeth33.
*Neopontonides* Holthuis, 1951.
- Rostrum distally compressed; dorsal teeth usually present (Figure 120, *A*)*Neopontonides* Holthuis, 1951.
33. Rostrum dorsally terminates in a point or is tridentate. Posterior orbital margin without incision; margin formed by anterior margin of carapace (Figure 119, *B*)*Pontonides* Borradaile, 1917.
- 72 — Rostrum frontally obtuse with anterior margin straight or toothed. Posterior orbital margin formed by carina located at some distance behind anterior margin of carapace; margin with distinct incision (Figure 120, *B* and *C*)*Veleronia* Holthuis, 1951.
34. Rostrum with dorsal teeth. Postorbital and antennal spines present; two additional spines present on middle and posterior regions of lateral surfaces of carapace (Figure 121, *A*)*Balssia* Kemp, 1922.

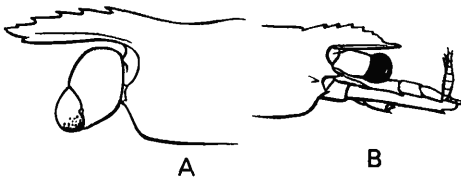


Figure 117. *A*—*Cavicheles kempi* Holthuis: anterior part of cephalothorax; *B*—*Waldola schmitti* Holthuis: anterior part of cephalothorax (from Holthuis, 1955).

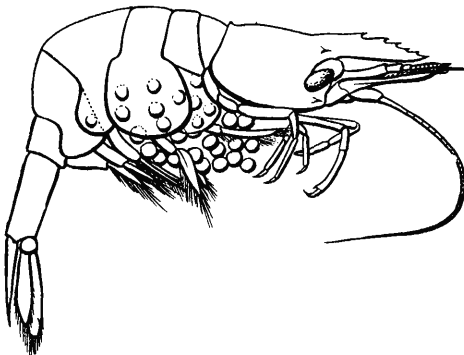


Figure 118. *Hamodactylus boschmai* Holthuis (from Holthuis, 1955).

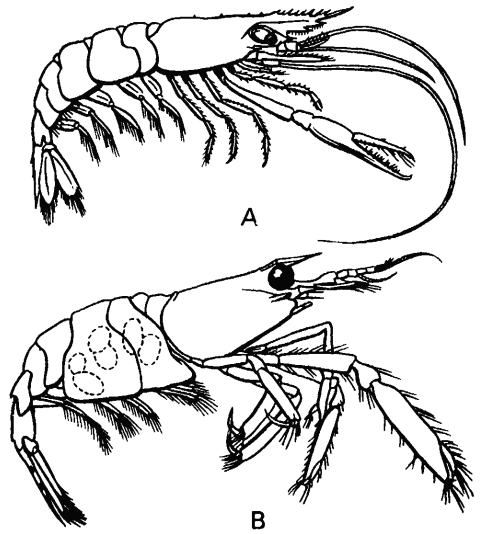


Figure 119. A—*Anchistiodes willeyi* (Borradaile); B—*Pontonides unciger* Calman (from Holthuis, 1955).

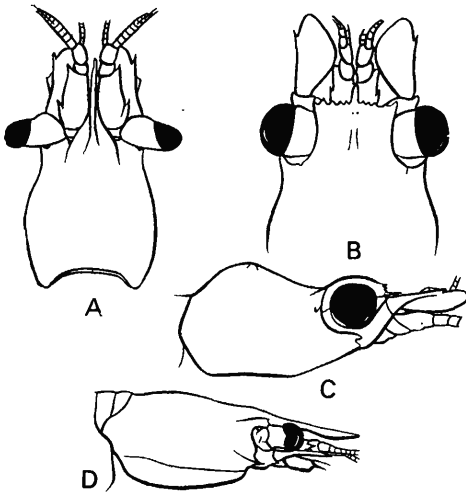


Figure 120. A—*Neopontonides beaufortensis* (Borradaile): cephalothorax (dorsal view); *Veleronia serratifrons* Holthuis: B—anterior part of cephalothorax (dorsal view); C—cephalothorax (lateral view); D—*Pseudocoutiërea elegans* Holthuis: cephalothorax (lateral view) (from Holthuis, 1955).

- Rostrum edentate 35.
- 73 35. Branchiostegal sinus and groove present 36.
- Branchiostegal sinus and groove absent *Lipkebe* Chace, 1969.
- 36. Pterygostomian and postorbital spines present. Dactyl of first* three pereopods with basal outgrowths (Figure 121, B) *Coutiërea* Nobili, 1901.
- Pterygostomian and postorbital spines absent. Dactyl of last three

*Error in original. Should read "last three pereopods"—Technical Editor.

- pereopods without basal outgrowths (Figure 120, *D*)
*Pseudocoutierea* Holthuis.
- 37. Exopod present on all maxillipeds. Rostrum present. Dactyl of last three pereopods biunguiculate (Figure 121, *C*)
*Typton* Costa, 1844.
- Maxillipeds II and III without exopods. Rostrum absent. Dactyl of last three pereopods simple (Figure 122) ... *Paratypton* Balss, 1914.

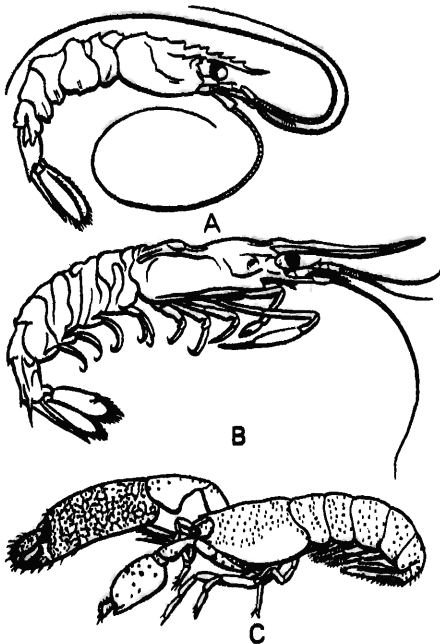


Figure 121. *A*—*Balssia gasti* (Balss); *B*—*Coutierea agassizi* (Coutière); *C*—*Typton tortugae* McClendon (from Holthuis, 1955).

FAMILY GNATHOPHYLLIDAE ORTMANN, 1890

KEY TO GENERA (FROM HOLTHUIS, 1955)

1. Width of last two segments of maxilliped III less than half width of third from last, which is approximately equal in width to preceding one. Dactyl of pereopod II edentate on upper side; carpus and merus without spine on anterior margin2.
- Last two segments of maxilliped III almost equal in width or broader than third from last, which is distinctly broader than preceding one. Dactyl of pereopod II dentate on upper side; carpus and merus with strong spines on anterior margin3.
2. Exopod of maxilliped III shorter than endopod. Dactyl of last three pereopods biunguiculate and without tubercles on posterior

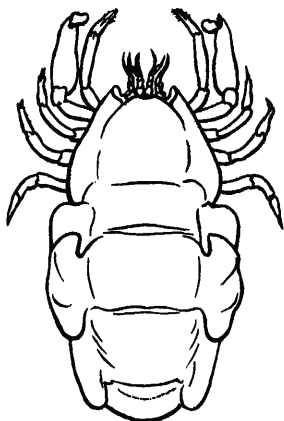


Figure 122. *Paratypton siebenrocki*
Balss (from Holthuis, 1955).

- 74 margin. Outer antennular flagellum bifid (Figure 123)
 *Gnathophyllum* Latreille, 1819.
- Exopod of maxilliped III longer than endopod. Dactyl of last three
 pereopods simple and with blunt tubercles along posterior margin.
 Outer antennular flagellum simple (Figure 124)
 *Gnathophylloides* Schmitt, 1933.
3. Outer antennular flagellum normal and flagellar. Chelae of
 pereopod II broad and flat but not discoid. Last two segments of
 maxilliped III, although broad, not broader than third from last
 (Figure 125) *Phyllognathia* Borradaile, 1915.
- Outer antennular flagellum broad, flat, and foliate. Propodus of two
 chelate legs broad; inner part in the form of a thin foliate appendage.
 Last two segments of maxilliped III significantly broader than third
 from last segment (Figure 126) *Hymenocera* Latreille, 1819.

FAMILY ALPHEIDAE BATE, 1888

KEY TO GENERA (FROM HOLTHUIS, 1955)

1. Pleura of thorax and abdomen horizontally positioned and very
 broad. Pleura of first abdominal somite cover a large part of
 carapace (Figure 127) *Pterocaris* Heller, 1862.
- Pleura of thorax and abdomen normal, not horizontal in position,
 and not unusually broad. Pleura of first abdominal somites cover
 at most a small section of posterolateral corners of carapace ... 2.
2. Epipods present on at least first two pairs of pereopods. 3.
- Epipods on pereopods absent 17.
3. Abdominal somite VI with movable plate joined to posterolateral
 corner 4.

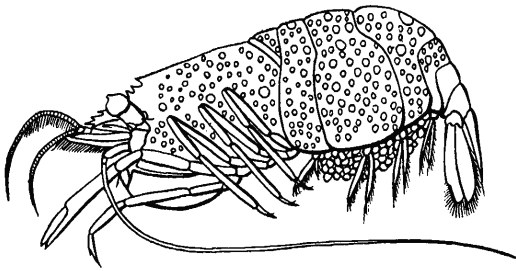


Figure 123. *Gnathophyllum panamense* Faxon (from Holthuis, 1955).

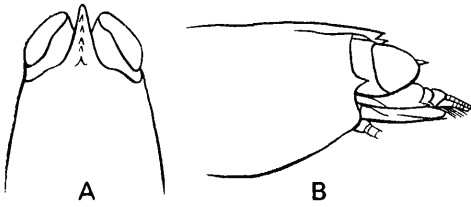


Figure 124. *Gnathophylloides mineri* Schmitt: frontal part of carapace: A—dorsal view; B—lateral view (from Holthuis, 1955).

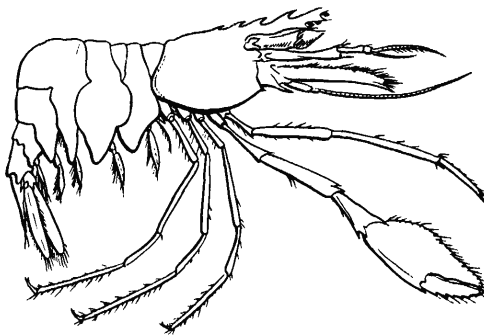
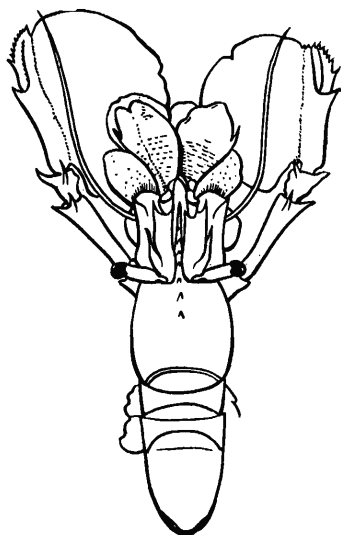


Figure 125. *Phyllognathia ceratophthalma* (Balss) (from Holthuis, 1955).

- Abdominal somite VI without movable posterolateral corner 11.
- 75 4. Rostrum prominent 5.
- Rostrum absent or very poorly developed 10.
- 5. Rostrum slender and sharply pointed in lateral view 6.
- Rostrum with a broad vertical lamella on ventral surface; tip of rostrum broadly rounded 9.
- 6. Arthrobranchiae present on maxilliped III or pereopod I 7.
- Arthrobranchiae either absent on maxilliped III or on pereopod I 8.
- 7. Posterior margin of telson straight or slightly rounded (Figure 128, A and B) *Alpheopsis* Coutière, 1897.
- 76 — Posterior margin of telson terminates in a sharply pointed triangular median tooth (Figure 128, C and D) *Neoalpheopsis* Banner, 1953.



75 Figure 126. *Hymenocera elegans*
Heller (from Holthuis, 1955).

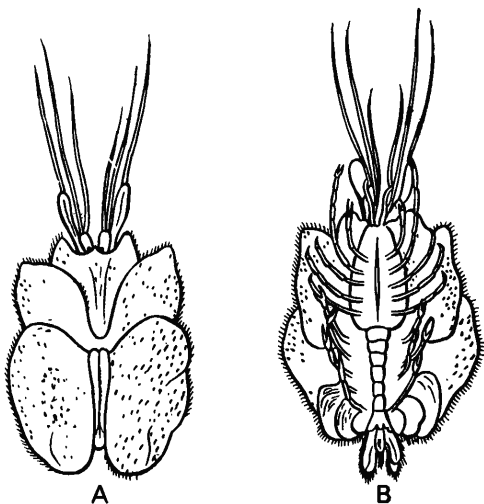


Figure 127. *Pterocaris typica* Hel-
ler. A—dorsal view; B—ventral
view (from Holthuis, 1955).

8. Epipods present on first three pairs of pereopods. Carpus of pereopod II five-subsegmented (Figure 129)
.....*Athanas* Leach, 1814.
- Epipods present on just first two pairs of pereopods. Carpus of pereopod II four-subsegmented (Figure 130, A and B)
.....*Arele* Stimpson, 1860.
9. Dactyl of last three pairs of pereopods simple. Eyes almost not visible in dorsal view (Figure 130, C and D).
.....*Athanopsis* Coutière, 1897.

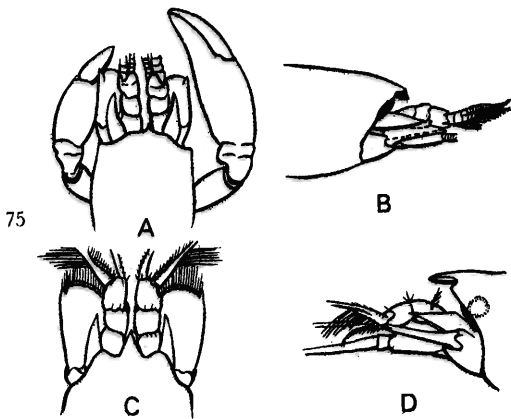


Figure 128. *Alpheopsis equalis* Coutiére: anterior part of cephalothorax: *A*—dorsal view; *B*—lateral view; *Neoalpheopsis hiatti* Banner: anterior part of cephalothorax; *C*—dorsal view; *D*—lateral view (from Holthuis, 1955).

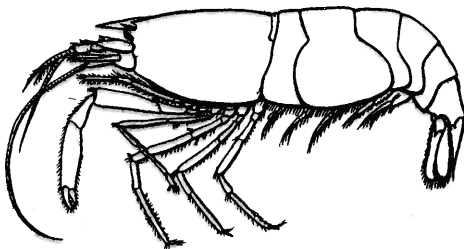


Figure 129. *Athanas nitescens* (Leach) (from Holthuis, 1955).

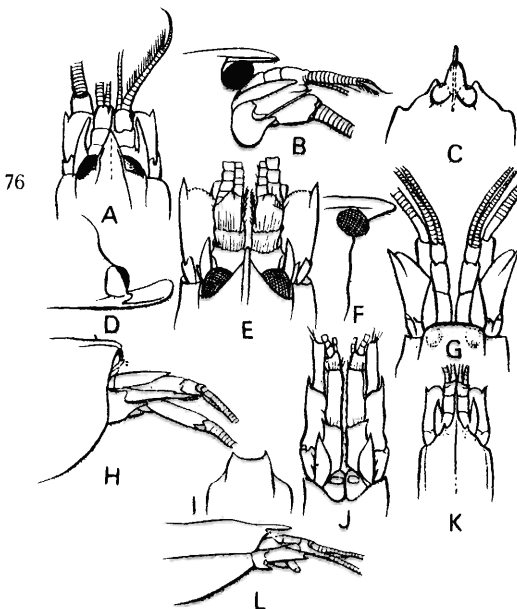


Figure 130. *Arete dorsalis* Stimpson: anterior part of body. *A*—dorsal view; *B*—lateral view; *Athanopsis platyrhynchus* Coutiére: *C*—dorsal view; *D*—lateral view; *Aretopsis amabilis* de Man: *E*—anterior end (dorsal view); *F*—rostrum (lateral view); *Betaeus truncatus* Dana: anterior end; *G*—dorsal view; *H*—lateral view; *Parabetaeus culhiete* Coutiére: *I*—rostrum, dorsal view; *Automate anacanthopus* de Man: *J*—anterior end, dorsal view; *Salmoneus jarli* (Holthuis): anterior end; *K*—dorsal view; *L*—lateral view (from Holthuis, 1955).

- Dactyl of last three pairs of pereopods biunguiculate. Eyes free and not covered (Figure 130, *E* and *F*)*Aretopsis* de Man, 1910.
- 10. Telson broad and distally rounded (Figure 130, *G* and *H*)*Betaeus* Dana, 1852.
- Telson slender and terminates distally in a sharp triangular point (Figure 130, *I*)*Parabetaeus* Coutière, 1897.
- 11. Movable finger of large chela without a large “chewing” tooth. Eyes always visible in frontal view12.
- Movable finger of large chela with a large “chewing” tooth lodged in socket on fixed finger. Eyes often totally hidden by carapace, even in frontal view14.
- 12. Eyes not covered in dorsal view. Rostrum, if present, does not extend to end of eye stalks (Figure 130, *J*)*Automate* de Man, 1888.

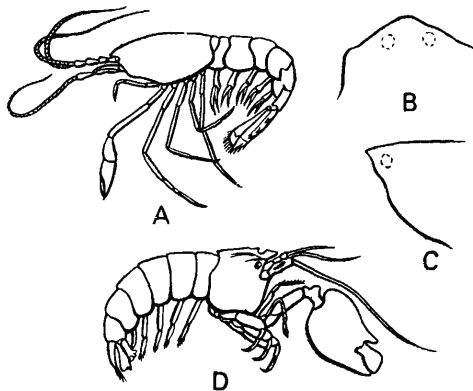


Figure 131. *A*—*Metabetaeus mimutus* (Whitelegge); *Amphibetaeus jousseaumei* Coutière: rostrum; *B*—dorsal view; *C*—lateral view; *D*—*Racilius compressus* Paulson (from Holthuis, 1955).

- 77 — Eyes fully or partly covered dorsally by carapace. Rostrum present and extends beyond eyes13.
- 13. Arthrobranchiae present on maxilliped III (Figure 130, *K* and *L*)*Salmoneus* Holthuis, 1955.
- Arthrobranchiae absent on maxilliped III (Figure 131, *A*)*Metabetaeus* Borradaile, 1899.
- 14. Eyes dorsally covered by carapace but visible in frontal view. Pereopod I folded under body (Figure 131, *B* and *C*)*Amphibetaeus* Coutière, 1897.
- Eyes more or less fully covered by carapace in frontal view and dorsally to some extent. Pereopod I not folded under body15.
- 15. Body highly compressed laterally. Abdomen with dorsal carina. Carapace with median dorsal carina throughout its length (Figure 131, *D*)*Racilius* Paulson, 1875.
- Body not compressed laterally. Abdomen without carina. Carina

- on carapace, if present, does not extend throughout its length16.
16. Cardiac notch present on posterior margin of carapace. Exopods of uropods with transverse suture (Figure 132)*Alpheus* Fabricius, 1798.
- Cardiac notch absent. Exopods of uropods without transverse suture (Figure 133, A)*Thunor* Armstrong, 1949.
17. Movable finger of large chela without “chewing” tooth. Dactyl of last three pereopods simple. Chelae of pereopods II very long, with unusually short fingers (Figure 133, B)*Batella* Holthuis, 1955.
- Movable finger of large chela with “chewing” tooth lodged in socket of immovable finger. Dactyl of last three pereopods bi- or triunguiculate. Chela of pereopod II normal18.
18. Ischium and merus of maxilliped III considerably broadened; form an operculum over remaining oral appendages (Figure 133, C and D)*Pomagnathus* Chace, 1937.
- Maxilliped III normal (Figure 134)*Synalpheus* Bate, 1888.

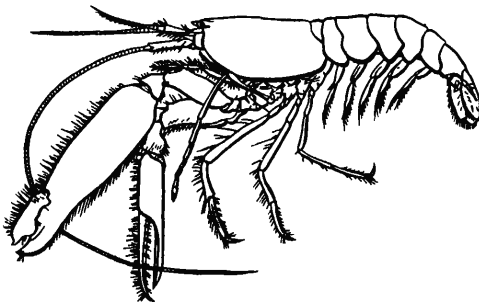


Figure 132. *Alpheus glaber* (Olivi)
(from Holthuis, 1955).

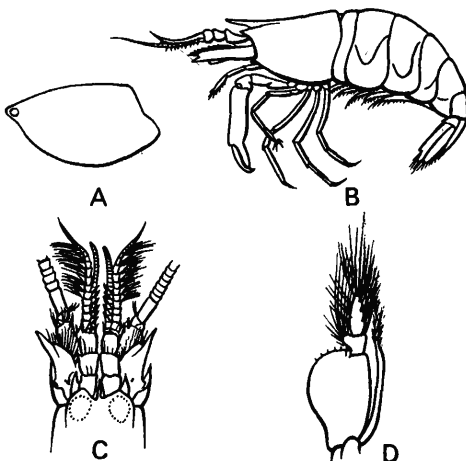


Figure 133. A—*Thunor rathbunae* (Schmitt): carapace (lateral view); B—*Batella parvimanus* (Bate); *Pomagnathus corralimus* Chace: C—anterior part of cephalothorax (dorsal view); D—maxillipeds III (from Holthuis, 1955).

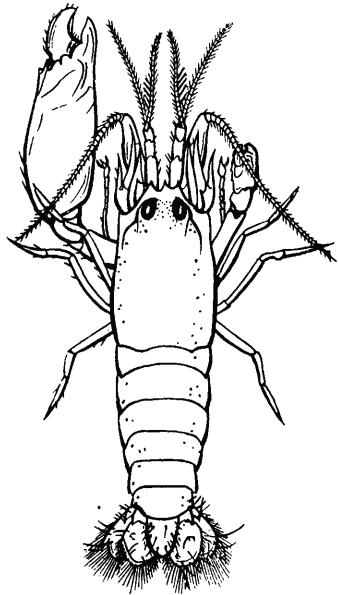


Figure 134. *Synalpheus brevicarpus*
(Herrick) (from Holthuis,
1955).

FAMILY HIPPOLYTIDAE BATE, 1888

KEY TO GENERA (FROM HOLTHUIS, 1955)

1. Arthrobranchiae present on bases of first four pairs of pereopods2.
- Arthrobranchiae absent on bases of pereopods5.
2. Posterolateral angle of abdominal somite VI with an articulated plate3.
- Posterolateral angle of abdominal somite VI without an articulated plate4.
3. Mandibles with incisorial process (Figure 135, A)*Saron* Thalwitz, 1891.
- Mandibles without incisorial process (Figure 135, B)*Nauticaris* Bate, 1888.
4. Mandibles with incisorial process (Figure 136, A)*Merhippolyte* Bate, 1888.
- Mandibles without incisorial process (Figure 136, B)*Ligur* Sarato, 1885.
5. Mandibles with palpus6.
- Mandibles without palpus15.
- 79 6. Supraorbital spines absent on carapace7.
- Supraorbital spines present on carapace10.

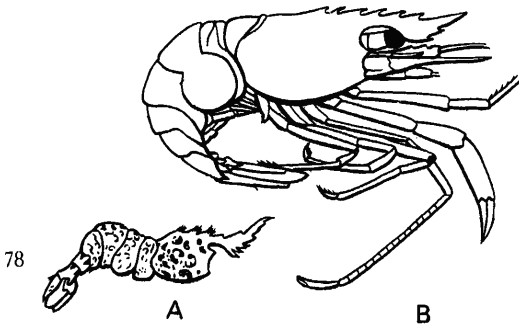


Figure 135. *A*—*Saron marmoratus* (Olivier); *B*—*Nauticaris marionis* Bate (from Holthuis, 1955).

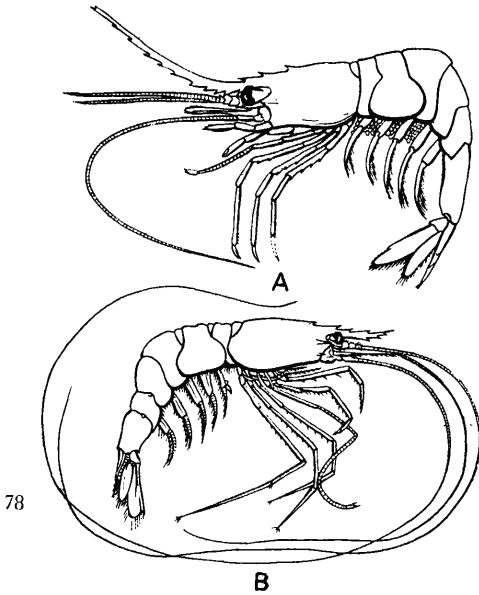


Figure 136. *A*—*Merhippolyte calmani* Kemp and Sewell; *B*—*Ligur ensiferus* (Risso) (from Holthuis, 1955).

- 7. Mandibular palpus three-segmented (Figure 137, *B*) *Alope* White, 1847.
- Mandibular palpus two-segmented 8.
- 8. Carapace with two or more supraorbital spines on each side. Maxilliped III with exopods (Figure 138, *B*) *Spirontocaris* Bate, 1888.
- Carapace with only one supraorbital spine on each side. Maxilliped III without exopods 9.
- 9. Abdominal somites dorsally rounded. Antennal and pterygostomian spines present. Branchiostegal spines absent (Figure 139, *A*) *Lebbeus* White, 1847.

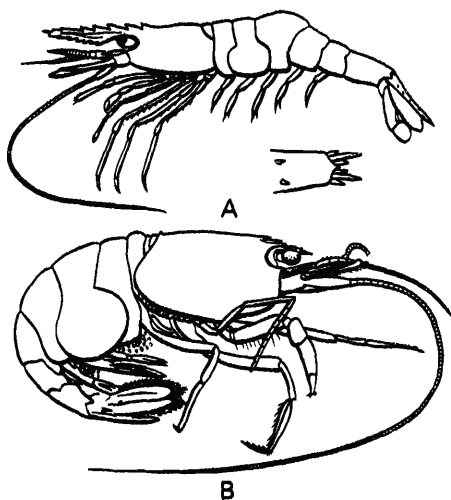


Figure 137. *A*—*Heptacarpus minutus* Yokoja; *B*—*Alope orientalis* (de Man).

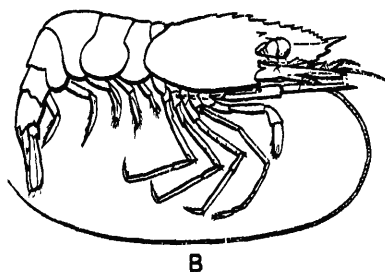
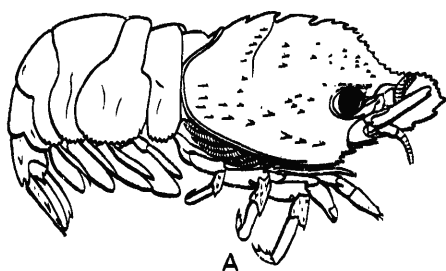


Figure 138. *A*—*Trachycaris restricta* (A. Milne-Edwards); *B*—*Spirontocaris lilljeborgi* (Danielsen) (from Holthuis, 1955)

- Abdominal segments I and II* with two, and II, III, and IV with one dorsal carina. Carapace with one large branchiostegal spine. Antennal or pterygostomial spines absent (Figure 139, *B*) *Birulia* Brashnikow; 1903.
10. Mandibular palpus three-segmented 11.

*Error in original. Should read "Abdominal segments I and V"—Technical Editor.

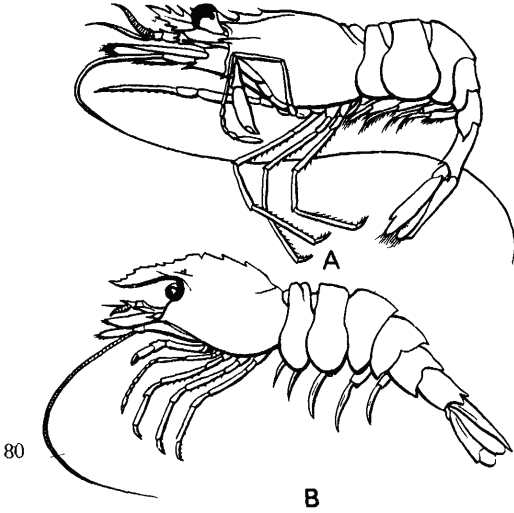


Figure 139. A—*Lebbeus polaris* (Sabine); B—*Birulia kishinouyei* (Yokoja) (from Holthuis, 1955).

- Mandibular palpus one- or two-segmented13.
- 11. Mandibles without incisorial process (Figure 140)
.....*Barbouria* Rathbun, 1912.
- Mandibles with incisorial process12.
- 12. Carpus of pereopod II two-subsegmented (Figure 141, A) . ❄
.....*Caridion* Goes, 1863.
- Carpus of pereopod II 9- to 12-subsegmented (Figure 141, B)
.....*Chorismus* Bate, 1888.
- 13. Carpus of pereopod II four-subsegmented. Mandibular palpus
unsegmented (Figure 142, A)*Leontocaris* Stebbing, 1905.
- Carpus of pereopod II seven-subsegmented. Mandibular palpus
two-segmented14.
- 80 14. Maxilliped III with endopod* (Figure 142, B)
.....*Eualus* Thallwitz, 1892.
- Maxilliped III without exopod (Figure 137, A)14.

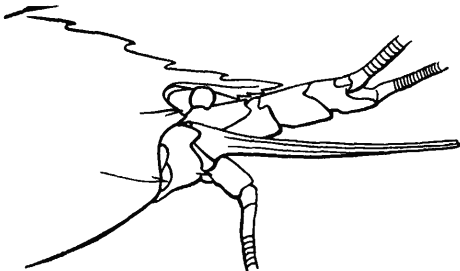


Figure 140. *Barbouria cubensis* (van Martens): anterior end (from Holthuis, 1955).

*Error in original. Should read “Maxilliped III with exopod”—Technical Editor.

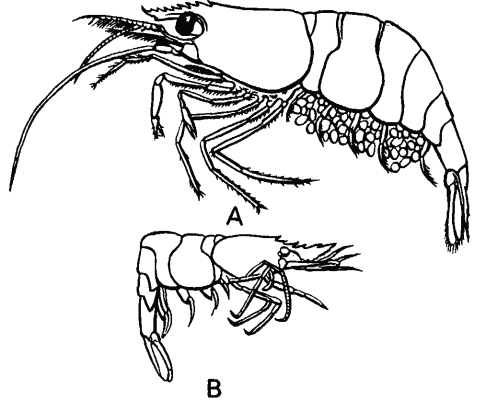


Figure 141. A—*Caridion gordonii* (Bate); B—*Chorismus antarcticus* (Pfeffer) (from Holthuis, 1955).

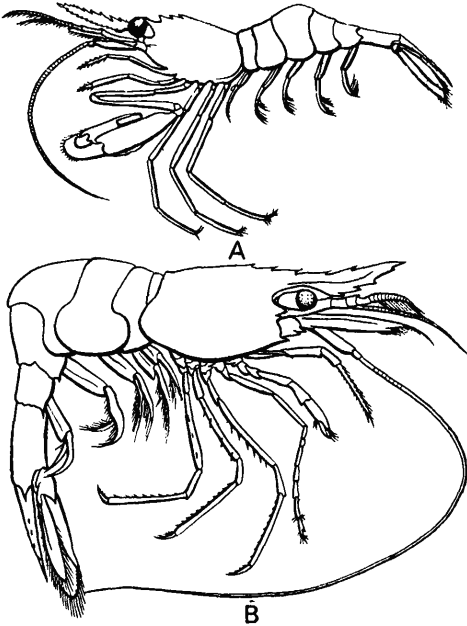


Figure 142. A—*Leontocaris lar* Kemp; B—*Eualus gaimardi* (H. Milne-Edwards) (from Holthuis, 1955).

81

-*Haptacarpus* Holmes, 1900.
- 15. Mandibles with incisorial process16.
- Mandibles without incisorial process20.
- 16. Carpus of pereopod II two- to three-subsegmented17.
- Carpus of pereopod II six- to seven-subsegmented18.
- 17. Carpus of pereopod II two-subsegmented (Figure 143)
-*Phycocaris* Kemp, 1916.
- Carpus of pereopod II three-subsegmented (Figure 144)
-*Hippolyte* Leach, 1814.



Figure 143. *Phycocaris simulans* Kemp (from Holthuis, 1955).

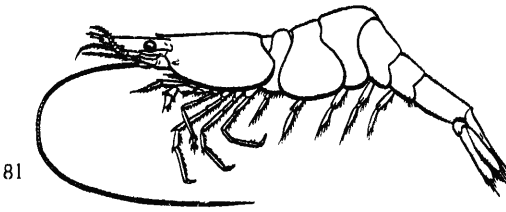


Figure 144. *Hippolyte varians* Leach (from Holthuis, 1955).

18. Dactyl of pereopod 1 less than one-sixth length of propodus. Telson with approximately 20 spinules on each lateral margin (Figure 145, A)*Cryptocheles* Sars, 1869.
 — Dactyl of pereopod I one-third or more length of propodus. Telson with less than five pairs of spinules arranged at some distance from lateral margin19.

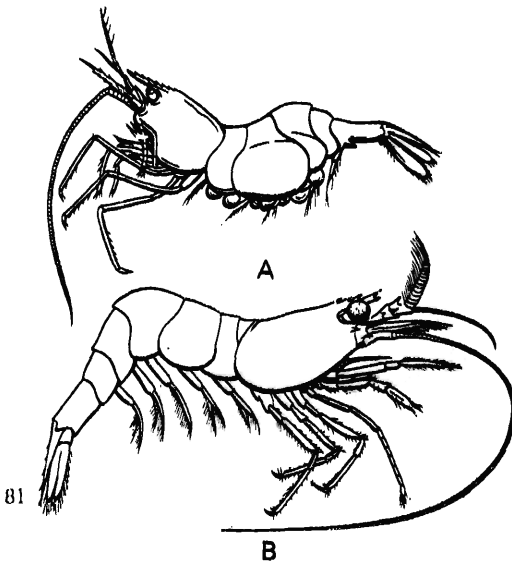
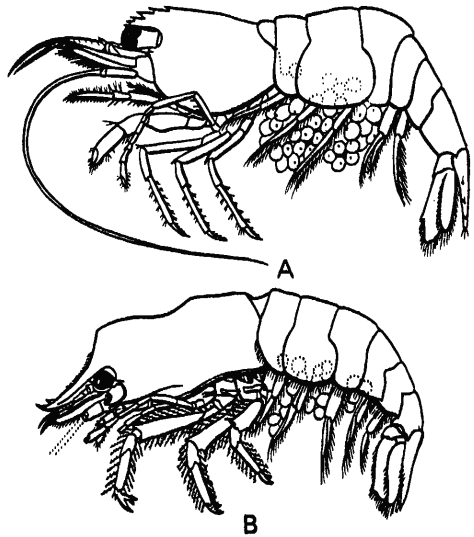


Figure 145. A—*Cryptocheles pygmaea* Sars; B—*Thoralus cranchi* (from Holthuis, 1955).

19. Epipods present on first two pairs of pereopods. Immobile* plate present on anterior margin of third segment of antennular peduncle (Figure 145, *B*) *Thor* Holthuis, 1947.
 — Epipods absent at bases of pereopods. Third segment of antennular peduncle with broad movable plate on upper part of anterior margin (Figure 146, *A*) *Thor* Kingsley, 1878.
20. Carpus of pereopod II two- to three-subsegmented 21.
 — Carpus of pereopod II multisubsegmented 25.



81 Figure 146. *A*—*Thor paschalis* (Heller); *B*—*Gelastocaris paronae* (Nobili) (from Holthuis, 1955).

- 82 21. Carpus of pereopod II two-subsegmented (Figure 138, *A*)
 *Trachycaris* Calman, 1906.
 — Carpus of pereopod II three-subsegmented 22.
22. Dactyl of last three pairs of pereopods with group of large teeth. Outer margin of scaphocerite armed with small movable teeth. Lower margin of abdominal pleura denticulate (Figure 146, *B*) ...
 *Gelastocaris* Kemp, 1914.
 — Dactyl of last three pairs of pereopods normal. Outer margin of scaphocerite edentate. Abdominal pleura without denticulation ...
 23.
23. Maxilliped III with exopods (Figure 147, *A*)
 *Latreutes* Stimpson, 1860.
 — Maxilliped III without exopods 24.
24. Epipods present on first four pairs of pereopods. Anterolateral

*Error in original. Should read "No movable plate present on anterior margin of third segment of antennular peduncle"—Technical Editor.

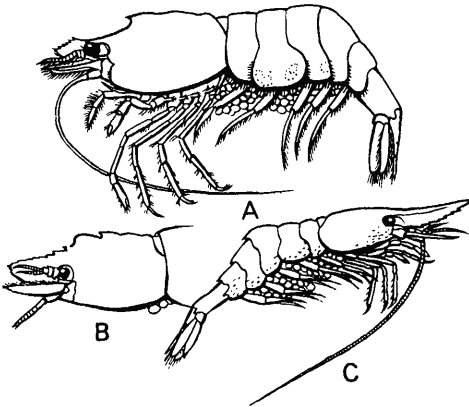


Figure 147. A—*Latreutes murconatus* (Stimpson); B—*Paralatreutes bicornis* Kemp; C—*Tozeuma novaezealandiae* Borradaile: cephalothorax, lateral view (from Holthuis, 1955).

- angle of carapace with several spinules (Figure 147, B) *Paralatreutes* Kemp, 1925.
- Epipods absent on pereopods. Anterolateral angle of carapace smooth, without spinules (Figure 147, C) *Tozeuma* Stimpson, 1860.
- 25. Abdominal segments terminate bluntly in a large, posteromedian spine. Pleura terminate in one or two points. Carapace with longitudinal carina (Figure 148, A) *Mimocaris* Nobili, 1908.

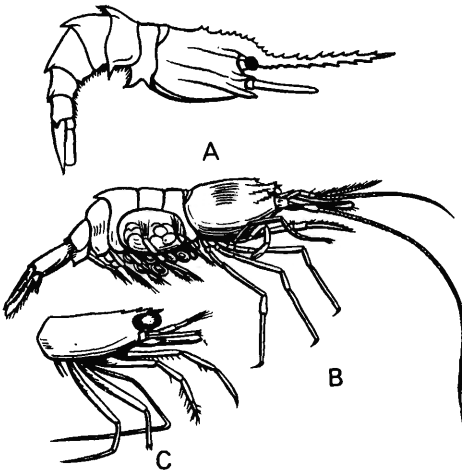
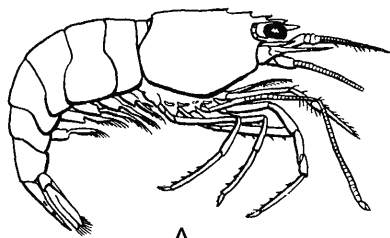


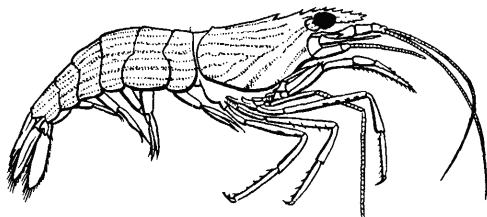
Figure 148. A—*Mimocaris heterocarpoides* Nobili; B—*Bythocaris leucopis* Sars; C—*Merguia oligodon* (de Man): cephalothorax (from Holthuis, 1955).

- 83 — Abdominal segments without large posterior spines. Pleura rounded. Carapace smooth 26.
- 26. Supraorbital spines present on carapace (Figure 148, B) *Bythocaris* Sars, 1870.
- Supraorbital spines absent on carapace 27.

27. Maxilliped III with exopods28.
 — Maxilliped III without exopods (Figure 148, *C*)
*Merguia* Kemp, 1914.
 28. Outer antennular flagellum bifid (Figure 149, *A*)
*Lysmata* Risso, 1816.
 — Outer antennular flagellum not bifid (Figure 149, *B* and Figure
 150)*Hippolysmata* Stimpson, 1860.



A



B

82 Figure 149. *A*—*Lysmata trisetacea* (Heller); *B*—*Hippolysmata vittata* (Stimpson) (from Holthuis, 1955).

FAMILY PANDALIDAE BATE, 1888

KEY TO GENERA (FROM HOLTHUIS, 1955, WITH ADDITIONS)

1. Carpus of pereopod II divided into more than three subsegments2.
 — Carpus of pereopod II divided into two or three subsegments
13.
2. Carapace without longitudinal carinae (except for postrostral crest)3.
 — Carapace with longitudinal carinae on lateral surfaces. Integument very firm12.*
3. Rostrum articulates with carapace (Figure 151, *A*)
*Pantomus* A. Milne-Edwards, 1883.
 — Rostrum does not articulate with carapace4.
4. Eyes poorly developed; cornea narrower than eye stalks (Figure 151, *B*)*Dorodotes* Bate, 1888.

*Error in original. Should read "14"—Technical Editor.

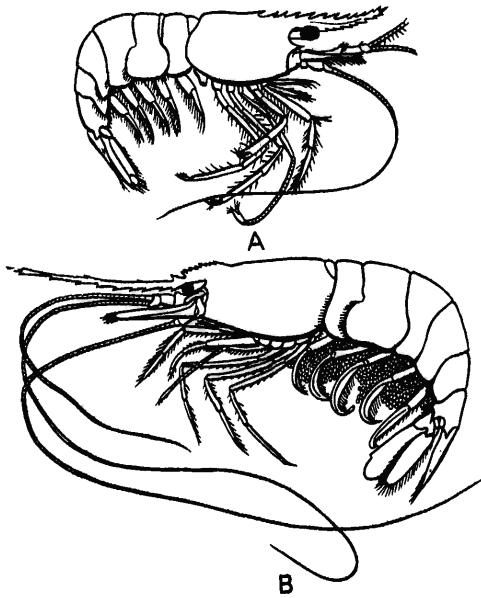


Figure 150. A—*Hippolysmata* (*Lysmatella*) *prima* (Borradaile); B—*Hippolysmata* (*Exhippolysmata*) *ensirostris* Kemp (from Holthuis, 1955).

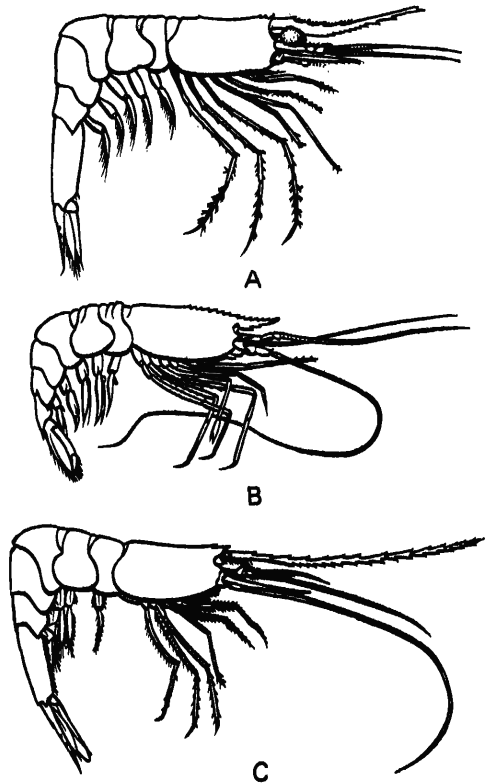


Figure 151. A—*Pantomus affinis* Chace; B—*Dorodotes reflexus* Bate; C—*Parapandalus richardi* (Coutiére) (from Holthuis, 1955).

- 84 — Eyes well developed; cornea much broader than eye stalks5.
5. Maxilliped III with exopods6.
- Maxilliped III without exopods8.
6. Epipods present on at least first two pairs of pereopods7.
- Epipods absent on pereopods (Figure 151, C)*Parapandalus* Borradaile, 1899.
7. Posterior lobe of scaphognathite broadly rounded or truncated. Stylocerites anteriorly pointed. Rostrum dorsally armed with at least a few fixed teeth (Figure 152, A)*Plesionika* Bate, 1888.

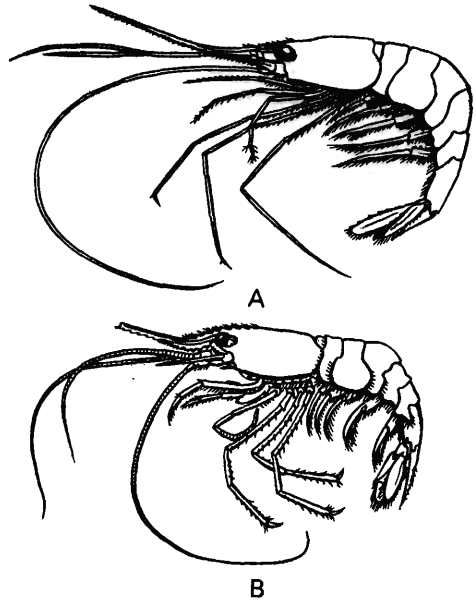


Figure 152. A—*Plesionika martia* (A. Milne-Edwards); B—*Pandalopsis ampla* Bate (from Holthuis, 1955).

- Posterior lobe of scaphognathite acutely pointed. Stylocerites broad and rounded. Rostrum dorsally armed with only movable teeth (Figure 153, A)*Dichelopandalus* Caullery, 1896.
8. Discoid widening of inner margin of ischium of pereopod I prominent (Figure 152, B)*Pandalopsis* Bate, 1888.
- Discoid widening of inner margin of ischium of pereopod I absent or undetectable9.
9. Epipods absent on pereopods (Figure 153, B)*Peripandalus* de Man, 1917.
- Epipods present on at least first two pairs of pereopods10.
10. Epipods present on pereopods I and II only*Notopandalus* Yaldwyn, 1960.
- Epipods present on pereopods I to IV11.
11. Arthrobranchiae absent on pereopods (Figure 154)

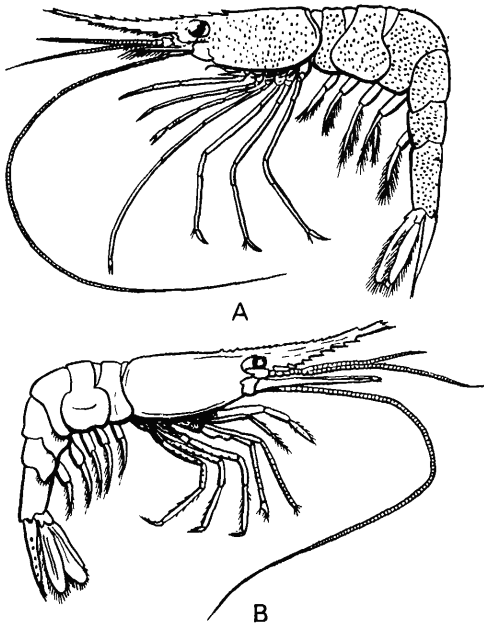


Figure 153. A—*Dichelopandalus leptoceras* (Smith); B—*Peripandalus serratus* (A. Milne-Edwards) (from Holthuis, 1955).

- *Pandalina* Calman, 1899.
- Arthrobranchiae present on first four pairs of pereopods 12.
- 85 12. Posterior lobe of scaphognathite acute. Upper margin of rostrum with only movable teeth (Figure 155, A) *Pandalus* Leach, 1814.
- Posterior lobe of scaphognathite truncated. Upper margin of rostrum with both fixed and movable teeth (Figure 155, B)
..... *Austropandalus* Holthuis, 1952.
- 13. Pereopods II very unequal (Figure 156, A)
..... *Heterocarpus* A. Milne-Edwards, 1881.
- Pereopods II equal; carpus six-subsegmented (Figure 156, B)
..... *Heterocarpoides* de Man, 1917.

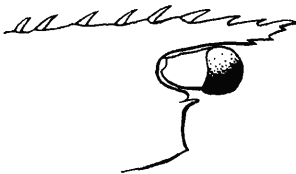
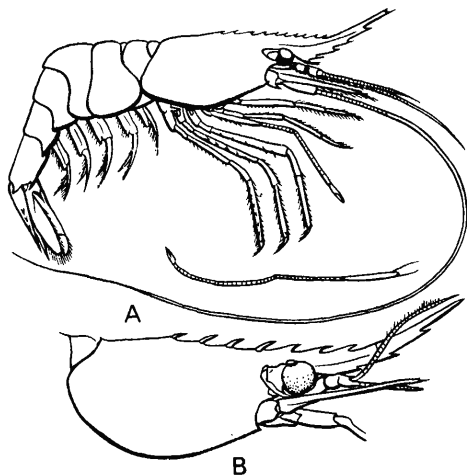
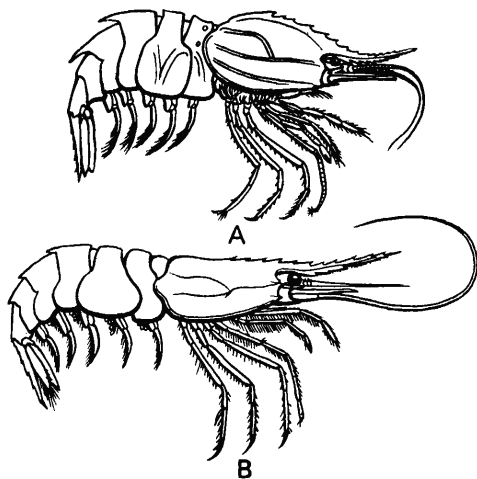


Figure 154. *Pandalina brevirostris* (Rathke) (from Holthuis, 1955).

- 86 14. Arthrobranchiae and epipods present on first four pairs of pereopods. Maxilliped III with exopods. Carpus of pereopod II two-subsegmented 15.
- Pereopods without arthrobranchiae and epipods. Maxilliped III



85 Figure 155. *A*—*Pandalus montagui* Leach; *B*—*Austropandalus grayi* (Cunningham) (from Holthuis, 1955).



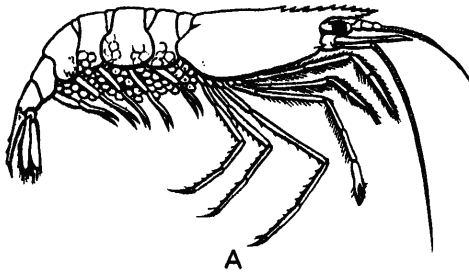
85 Figure 156. *A*—*Heterocarpus sibogae* de Man; *B*—*Heterocarpooides levicarina* (Bate) (from Holthuis, 1955).

- without arthrobranchiae.* Carpus of pereopod II three-subsegmented15.**
15. Pleura of first four abdominal somites rounded. Abdominal somite VI without median spine. Tip of telson pointed (Figure 157, *A*)*Chlorotocus* A. Milne-Edwards, 1882.
- Pleura of abdomen pointed on lower side. Abdominal somite VI with a large spine in middle of distal margin. Tip of telson bifurcate (Figure 157, *B*)*Chlorotocoides* Kemp, 1925.
16. Supraorbital spine present. Mandibles with three-segmented palpus. Rostrum long and slender (Figure 158).

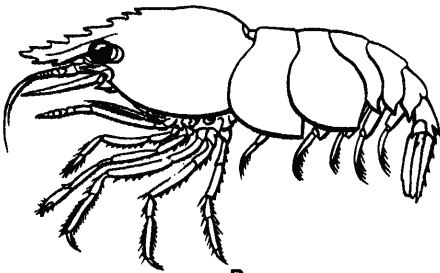
*Error in original. Should read "Maxilliped III without exopods"—Technical Editor.

**Error in original. Should read "16"—Technical Editor.

.....*Chlorotocella* Balss, 1914.
 — Supraorbital spine absent. Mandibles without palpus. Rostrum short and high (Figure 159)*Chlorocurtis* Kemp, 1925.



A



B

35

Figure 157. A—*Chlorotocus novaezealandiae* (Borradaile); B—*Chlorotocooides spinicauda* (de Man) (from Holthuis, 1955).

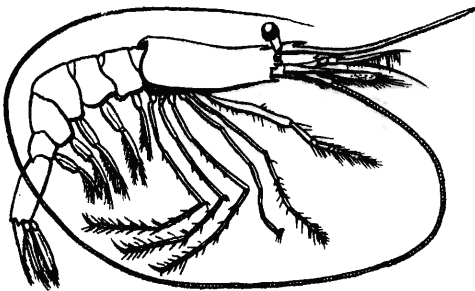


Figure 158. *Chlorotocella gracilis* Balss (from Holthuis, 1955).

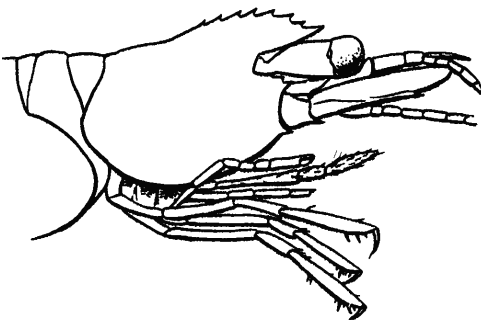
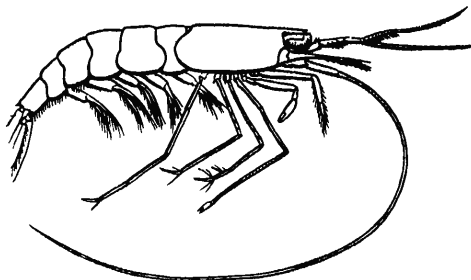


Figure 159. *Chlorocurtis jactans* (Nobili): anterior end (from Holthuis, 1955).

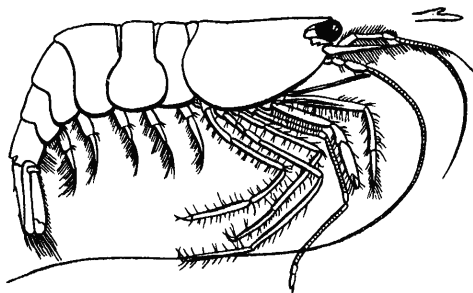
FAMILY PROCESSIDAE ORTMANN, 1898

KEY TO GENERA

1. Both pereopods I chelate.*Ambidexter* Manning and Chace, 1971.
- Only one (usually right) pereopod I chelate; other with simple dactyl2.
2. Pereopod I without exopods (Figure 160)*Processa* Leach, 1815.
- Pereopod I with exopods (Figure 161)*Nikoides* Paulson, 1875.



87 Figure 160. *Processa canaliculata*
Leach (from Holthuis, 1955).



87 Figure 161. *Nikoides maldivensis*
Borradaile (from Holthuis,
1955).

FAMILY CRANGONIDAE BATE, 1888

KEY TO GENERA (FROM HOLTHUIS, 1955; ZARENKOV, 1965)

1. Pereopod II absent (Figure 162, A)*Paracrangon* Dana, 1852.
- Pereopod II present2
2. Pereopod II simple, without chelae3.
- Pereopod II chelate5.
3. Eyes reduced to a small sharp process; cornea absent
-*Prionocrangon* Wood-Mason and Alcock, 1891.
- Eyes well developed; cornea present and large4.
4. Pereopod II rudimentary, slender, and short; does not reach end of merus of pereopod I. Scaphocerite with a terminal spine (Figure

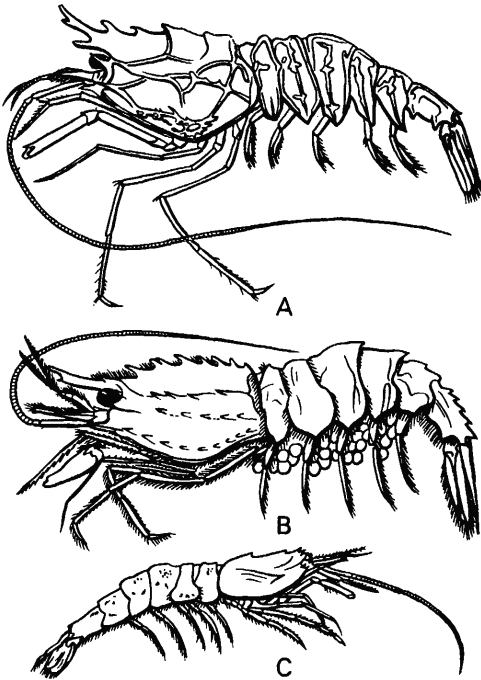


Figure 162 A—*Paracrangon areolata* Faxon; B—*Sabinea hystrix* (A. Milne-Edwards); C—*Argis toyamaensis* (Yokoya) (from Holthuis, 1955).

- 162, B)*Sabinea* Ross, 1835.
- 87 — Pereopod II well developed and with broad segments; extends beyond merus of pereopod I. Scaphocerite without terminal spine (Figure 163)*Vercoia* Baker, 1904.
- 5. Dactyl of pereopods IV and V flat and broad (Figure 164).
.....*Nectocrangon* Brandt.
- Dactyl of pereopods normal and broad*6.
- 6. Pereopod II almost equal in length to other pereopods7.
- Pereopod II shorter than other pereopods12.
- 88 7.**Endopod on pleopod II of male totally reduced; appendix masculina long, slender, and with several short terminal spines (Figure 165)*Notocrangon* Coutiére, 1905
(only species: *N. antarcticus* Pfeffer, 1887).
- 8. Body sculpture well developed. Not less than two spines on median line of carapace9.
- Body sculpture poorly developed. Only one spine on median line of carapace (Figure 166)*Crangon* Fabricius, 1758.
- a. Maxilliped III with reduced arthrobranchiae. Dorsal carina on

*Error in original. Should read “Dactyl of pereopods IV and V normal and not broad”—Technical Editor.

**Key for No. 7 omitted in original—Technical Editor.

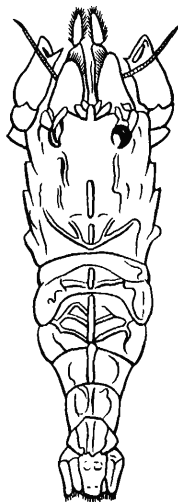


Figure 163. *Vercoia gibbosa* Baker
(from Holthuis, 1955)

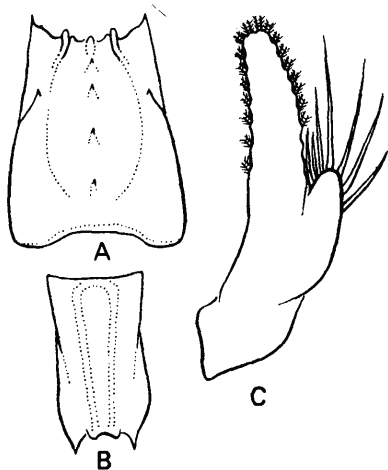
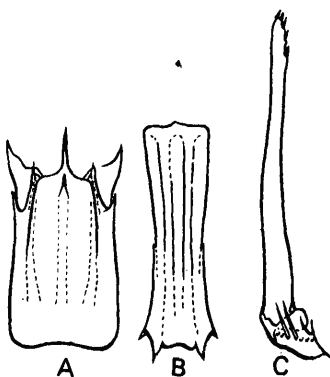


Figure 164. *Nectocrangon crassa*
Rathbun. (legend same as in
Figure 166) (from Zarenkov,
1965).

Figure 165. *Nectocrangon antarcticus*
(Pfeffer) (legend same as in
Figure 166) (from Zarenkov,
1965).



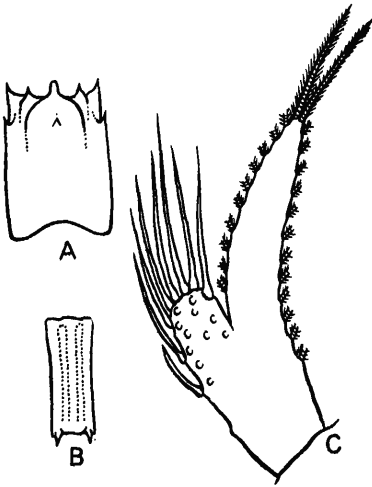


Figure 166. *Crangon ralli* Rathbun: A—carapace (dorsal view); B—sixth abdominal segment; C—endopod of pleuropod II of male (from Zarenkov, 1965).

sixth abdominal segment barely noticeable or absent

.Subgenus *Crangon* Fabricius, 1758.

— Maxilliped III without arthrobranchiae. Dorsal carina on sixth abdominal segment well developed but does not reach to posterior margin of segment.

.Subgenus *Neocrangon* Zarenkov, 1965.

9. Not less than three spines or low tubercles on median line of carapace10.

— Two spines or tubercles on median line of carapace; lateral spine in gastric region. Sixth abdominal segment cylindrical with two distinct carinae which do not reach its posterior margin (Figure 167)*Mesocrangon* Zarenkov, 1965.

89

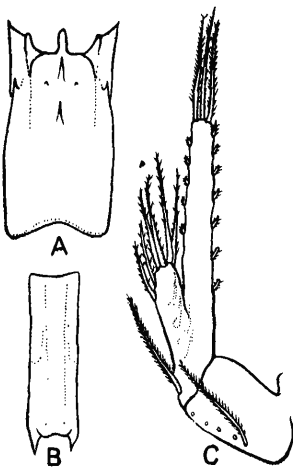


Figure 167. *Mesocrangon intermedia* (Stimpson) (legend same as in Figure 166) (from Zarenkov, 1965).

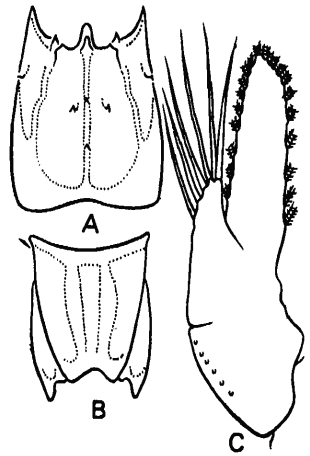


Figure 168. *Metacrangon robusta* (Kobjakova) (legend same as in Figure 166) (from Zarenkov, 1965).

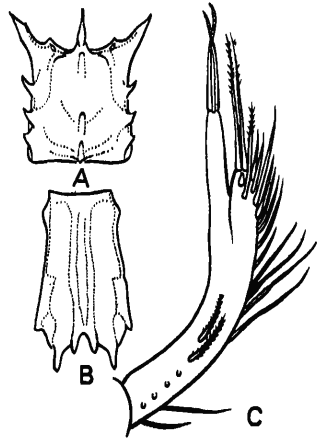


Figure 169. *Rhynocrangon sharpi* (Ortmann) (legend same as in Figure 166) (from Zarenkov, 1965).

10. Dorsal carinae of sixth abdominal segment sharp and reach its posterior margin 11.
- Dorsal carinae of sixth abdominal segment distinct but do not reach its posterior margin. Anterior margin of carapace raised. Suborbital spine separated from orbital by a narrow incision (Figure 168) *Metacrangon* Zarenkov, 1965.
- 90 11. Endopod of pleopod II of male with only one or two terminal setae and longer than appendix masculina (Figure 169) *Rhynocrangon* Zarenkov, 1965.
- Endopod of pleopod II of male highly reduced; appendix masculina large and with thick naked setae (Figure 170). *Sclerocrangon* G. O. Sars, 1883.
12. Lateral sides of body with six or seven branchiae each; branchial tips directed backward (Figure 171) *Pontophilus* Leach, 1917.

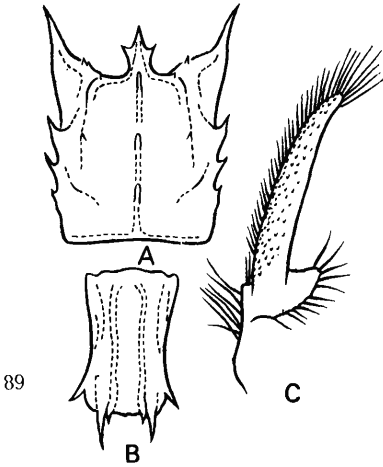


Figure 170. *Sclerocrangon derjugini* Kobjakova (legend same as in Figure 166) (from Zarenkov, 1965).

89

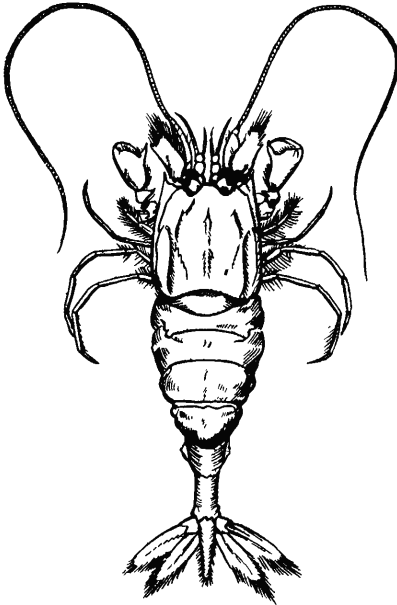


Figure 171. *Pontophilus bidentatus* (de Haan) (from Holthuis, 1955).

— Lateral sides of body with eight branchiae each; branchial tips directed forward (Figure 172) *Pontocaris* Bate, 1888.

Tribe Stenopodidea Bate, 1888

FAMILY STENOPODIDAE HUXLEY, 1878

KEY TO GENERA (FROM HOLTHUIS, 1955)

1. Body compressed. Telson elongated; tip terminates in two strong

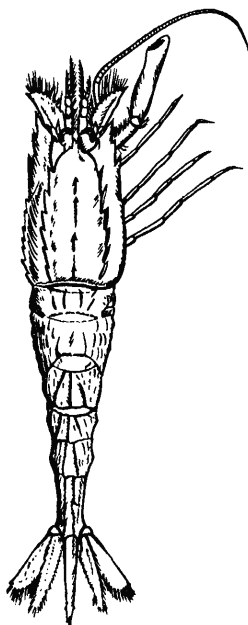


Figure 172. *Pontocaris lacazei*
(Gourret) (from Holthuis,
1955).

- spines, sometimes with a small spinule between them. Endopod of uropod with two dorsal crests: median crest strong and inner one weaker with several dorsal hairs. Maxilliped III with well-developed exopod 2.
- Body depressed. Telson broad and lanceolate or rectangular; terminates in three or five spines of equal size (sometimes without terminal spinule). Endopod of uropod with one median dorsal crest. Maxilliped III without or with rudimentary exopod (sometimes exopod well developed). 5.
2. Dactyl of pereopods IV and V biunguiculate and short 3.
- Dactyl of pereopods IV and V simple and relatively long and slender 4.
- 91 3. Carapace and abdomen densely covered with uniformly distributed stout spines sometimes arranged in longitudinal rows. Spines hard and anteriorly directed. Ischium of maxilliped III with outer spinules (Figure 173, A) *Stenopus* Latreille, 1819.
- Abdomen without dorsal spines, sometimes with spinules near lateral margins of pleura. Carapace with spines along posterior margin of cervical groove, often in parallel rows. Spines erect, anteriorly directed, and pressed to surface of carapace. Ischium of maxilliped III without outer spinules (Figure 173, B)
. *Odontozona* Holthuis, 1946.
4. Carapace with distinct dorsal row of spines along posterior margin

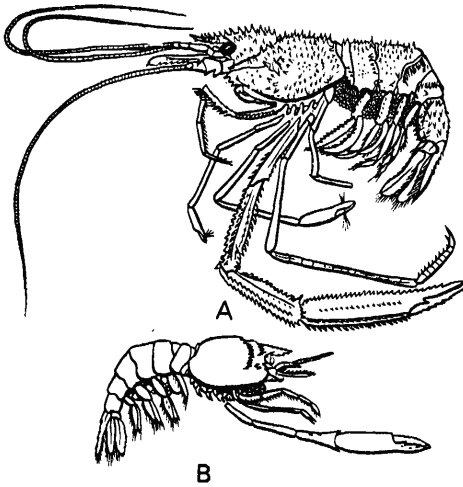


Figure 173. A—*Stenopus hispidus* (Olivier); B—*Odontozona spongicola* Alcock and Anderson (from Holthuis, 1955).

of cervical groove. Propodus of pereopod III not more than twice as wide as carpus. Fingers of pereopod III edentate (Figure 174) *Richardina* A. Milne-Edwards, 1881.

- Carapace smooth or with uniformly arranged spines in an indistinct row along posterior margin of cervical groove. Propodus of pereopod II* more than twice as wide as carpus. Fingers of pereopod III distinctly dentate along cutting edges (Figure 175). *Engystenopus* Alcock and Anderson, 1894.

92

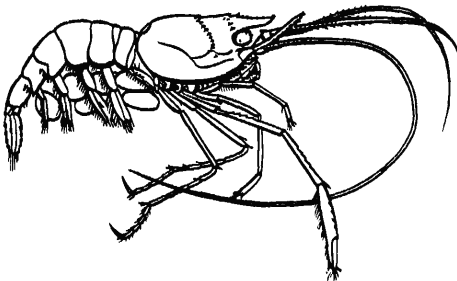
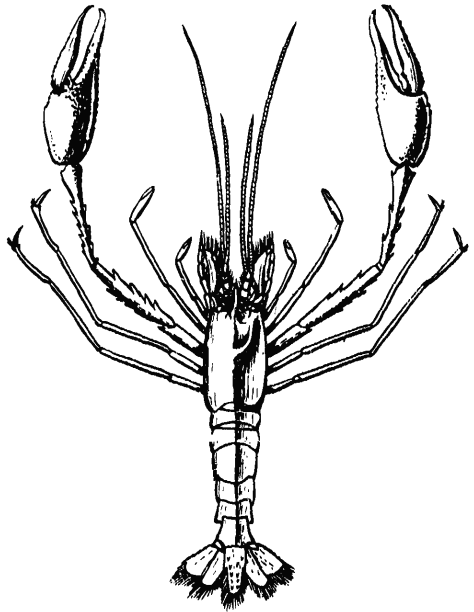


Figure 174. *Richardina spinicincta* A. Milne-Edwards (from Holthuis, 1955).

91

- 5. Maxilliped III with long and slender exopod. Carapace covered with large number of spines. Pereopod I with setigerous organ on ventral side of anterior part of carpus and on posterior part of propodus (Figure 176) *Microprosthema* Stimpson, 1860.
- Exopod on maxilliped III absent or rudimentary. Carapace smooth or with few spines near anterior margin. Pereopod I without setigerous organ 6.

*Error in original. Should read "Propodus of pereopod III"—Technical Editor.



91 Figure 175. *Engystenopus palmipes*
Alcock and Anderson (from
Holthuis, 1955).

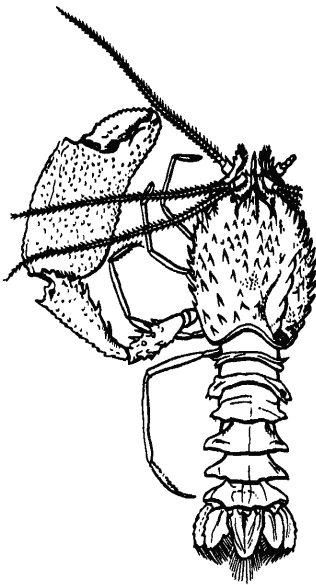


Figure 176. *Microprosthema vali-*
dum Stimpson (from Holthuis,
1955).

6. Chela of pereopod III with serrate upper and lower margins. Exopod present on maxilliped II, and rudimentary on maxilliped III (Figure 177, A) *Spongicola* de Haan, 1844.
— Chela of pereopod III with smooth upper and lower margins.

Exopod absent on maxillipeds II and III (Figure 177, B)
*Spongicoloides* Hansen, 1908.

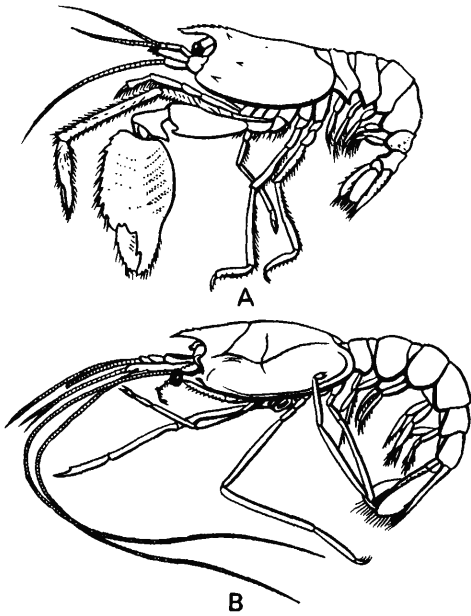


Figure 177. A—*Spongicola venusta* de Haan; B—*Spongicoloides inermis* (Bouvier) (from Holthuis, 1955).

Genus *Stenopus* Latreille, 1819

KEY TO SPECIES (FROM HOLTHUIS, 1955)

1. Outer margin of scaphocerite smooth over quite some distance before terminal tooth. No distinct transverse rows of spinules on last three abdominal somites; somite VI with spinules arranged more or less in distinct longitudinal rows2.
- Outer margin of scaphocerite serrate up to terminal tooth. Spinules on last three abdominal somites arranged in distinct transverse rows3.
2. Rostrum ventrally smooth. All segments of pereopods I, II, IV, and V smooth or armed with scattered spinules (Figure 173, A) ...
*S. hispidus* (Olivier, 1811).
- 93 — Rostrum with three to nine spines on ventral surface. Most segments of pereopods I, II, IV, and V with longitudinal rows of numerous spinules*S. tenuirostris* de Man, 1888.
3. Rostrum with a lateral row of spines. Scaphocerite with three or more spinules on base of outer margin; upper surface always with longitudinal rows of spinules*S. spinosus* Risso, 1826.

- Rostrum with one lateral spine or no spine, and rarely with two spines. Scaphocerite with one spinule at base of outer margin; upper surface smooth *S. scutellatus* Rankin, 1898.

Genus *Odontozona* Holthuis, 1946

KEY TO SPECIES (FROM HOLTHUIS, 1946)

1. Species inhabits Indo-Pacific region 2.
- Species inhabits northwest coast of Africa from Sudan to Bojador Cape *O. edwardsi* (Bouvier, 1908).
2. Posterior half of carapace groove with several distinct transverse rows of spinules. Carapace flat 3.
- Posterior half of carapace, behind row of spinules along cervical groove, without spinules. Carapace convex (Figure 173, *B*) *O. spongicola* (Alcock and Anderson, 1899).
3. Abdomen without grooves. Carapace with several distinct rows of spinules behind cervical groove; several spinules located near anterior margin but not dense rows *O. ensifera* (Dana, 1852).
- Abdominal somites I, II, IV, V, and VI with distinct transverse grooves and somite III with distinct longitudinal grooves. Carapace densely covered with numerous spinules arranged more or less in transverse rows *O. sculpticaudata* Holthuis, 1946.

Genus *Richardina* A. Milne-Edwards, 1881

KEY TO SPECIES (FROM HOLTHUIS, 1946)

1. Row of 25 to 30 spines located posterior to cervical groove. Outer margin of scaphocerite with two to five median teeth. Outer margin of exopod of uropod with four to five teeth (Figure 174) *R. spinicincta* A. Milne-Edwards, 1881.
- Row of 16 spines located posterior to cervical groove. Outer margin of scaphocerite with six to eight teeth. Outer margin of exopod of uropod usually with seven teeth *R. fredericii* Le Bianco, 1903.

Genus *Engystenopus* Alcock and Anderson, 1894

KEY TO SPECIES (FROM HOLTHUIS, 1946)

1. Carapace without spinules. Fingers of chelae of pereopod I not very long but slender. Propodus and carpus of pereopods IV and V not divided into subsegments or indistinctly subdivided (Figure 175) *E. palmipes* Alcock and Anderson, 1894.

- Carapace covered with spinules. Fingers of chelae of pereopod I very long and slender. Propodus and carpus of pereopods IV and V distinctly subsegmented *E. spinulatus* Holthuis, 1946.

94 **Genus *Microprosthema* Stimpson, 1860**

KEY TO SPECIES (FROM HOLTHUIS, 1946)

1. Propodus of pereopod III with distinct dorsal crest 2.
 — Propodus of pereopod III without distinct dorsal crest 3.
 2. Posterior half of dorsal surface of abdominal somite III with short longitudinal median carina. Outer margin of scaphocerite with two or three strong teeth (Figure 176)
 *M. validum* Stimpson, 1860.
 — Longitudinal median carina absent on posterior half of dorsal surface of abdominal somite III. Outer margin of scaphocerite with five to six small teeth *M. semilaeve* (van Martens, 1872).
 3. Abdomen smooth. Telson with two longitudinal crests, each with three strong spines. Scaphocerite broad
 *M. plumicorne* (Richters, 1880).
 — Abdomen with transverse rows of tubercles. Telson with longitudinal crests, each with one strong spine. Scaphocerite very narrow with poorly developed external tooth
 *M. scabricaudatum* (Richters, 1880).

Genus *Spongicola* de Haan, 1849

KEY TO SPECIES (FROM HOLTHUIS, 1946)

1. Dactyl of pereopod III with one ventral tooth located against dorsal tooth of fixed finger. Dactyl of pereopods IV and V triunguiculate (Figure 177, A) *S. venusta* de Haan, 1841.
 — Ventral tooth on dactyl of pereopod III coincident with two dorsal teeth of fixed finger. Dactyl of pereopods IV and V biunguiculate 2.
 2. Merus of pereopod III with two ventral spines. Fingers of pereopod III less than three-fourths length of palm
 *S. andamanica* Alcock, 1901.
 — Merus of pereopod III without ventral spines but with one dorsal and one lateral spine. Fingers of pereopod III more than three-fourths length of palm *S. henshawi* Rathbun, 1906.

Genus *Spongicoloides* Hansen, 1908

KEY TO SPECIES (FROM HOLTHUIS, 1946)

1. Epipods present on bases of pereopods I to IV

-*S. kochleri* (Caullery, 1896).
- Epipods absent on bases of pereopods I to IV but sometimes scars visible in their place2.
2. Maxilliped III and pereopods I to IV with two arthrobranchiae each. Scars of epipods visible on pereopods.
.....*S. evolutus* (Bouvier), 1905.
- Maxilliped III and pereopods I to IV with only one arthrobranchia each. Scars of epipods not visible on pereopods3.
3. Cornea equal to or wider than stalk. Carapace with some spinules on anterior portion*S. profundus* Hansen, 1908.
- Cornea much narrower than stalk. Carapace smooth (Figure 177, B)*S. inermis* (Bouvier), 1905.

SUBORDER REPTANTIA BOAS, 1880

KEY TO SECTIONS (FROM BALSS, 1957)

1. Pereopod III similar to pereopod I, either chelate or simple, or almost cylindrical. Abdomen always straight and symmetrical with well-developed pleura and a broad tail fan2.
- 95 — Pereopod III differs from pereopod I and nonchelate. Abdomen rarely straight but symmetrical with well-developed pleura and a tail fan3.
2. Rostrum small or absent (except in *Palinurellus*). Body often slightly depressed. Chelae usually absent; if present, movable finger located on outer side
.....Section **Palinura** (spiny lobsters or rock lobsters).
- Rostrum well developed. Body almost cylindrical. Pereopods chelate; movable finger of chelae located on inner side
.....Section **Astacura** (cray fishes).
3. Pereopod V always differs from pereopod III in size, shape, and location. Abdomen slightly reduced, very rarely straight and symmetrical, but still performs a number of functions other than reproduction and egg-laying. Uropods almost always present. Maxilliped III usually narrowSection **Anomura**.
- Pereopod V similar to pereopod III. Abdomen small, symmetrical, straight, folded under cephalothorax, and functions only in reproduction. Uropods absent. Maxilliped III usually broad
.....Section **Brachyura** (crabs).

Section PALINURA Borradaile, 1907

KEY TO TRIBES (FROM BALSS, 1957)

1. Pereopods I to IV chelate; movable finger of chelae located on

- outer side. Pereopod I rarely longer than all others. Telson terminates in a cusp Tribe **Eryonidea**.
- Pereopods I to IV nonchelate. Pereopod I rarely longer than others. Telson lobate Tribe **Scyllaridea**.

Tribe Eryonidea de Haan, 1844

FAMILY POLYCHELIDAE WOOD-MASON, 1877

Polychelidae is the only extant family of this tribe. The other families are extinct.

KEY TO GENERA

1. Eye stalks located in deep incision on anterior margin of carapace. Finger of cheliped I without tooth 2.
- Eye stalks located below and parallel to anterior margin of carapace. Finger of cheliped I with subapical tooth
 *Willemoesia* Grote, 1873.
2. Epipod of maxilliped III fairly large, normal, and raised into branchial chamber (Figure 178). *Polycheles* Heller, 1862.
- 96 — Epipod of maxilliped III resembles a simple papilla, a membranous outgrowth of the podobranchia (Figure 179).
 *Stereomastis* Bate, 1888.

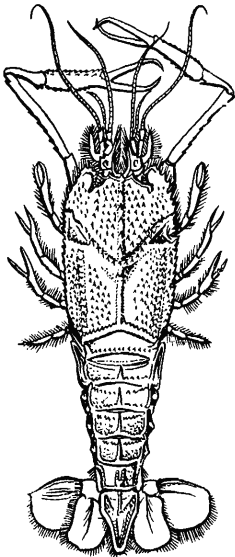


Figure 178. *Polycheles typhlops perarmatus* Holthuis (from Holthuis, 1955).

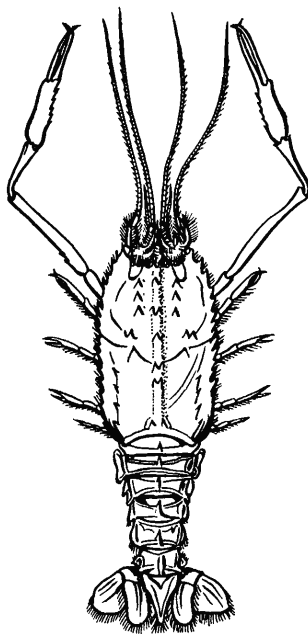


Figure 179. *Stereomastis sculpta*
(Smith) (from Holthuis, 1952).

Tribe Scyllaridea Borradaile, 1870

KEY TO FAMILIES

1. Carapace almost cylindrical in shape. Antennae with long segmented flagella.....Family **Palinuridae** Gray, 1847.
- Carapace more or less flat. Antennae short and flat; flagella nonsegmented, flat, and spatulate
.....Family **Scyllaridae** White, 1847.

FAMILY PALINURIDAE GRAY, 1847

KEY TO GENERA

1. Supraorbital spines or processes present above eye stalks and directed anteriorly. Carapace armed with spines and tubercles
.....2.
- Supraorbital spines or processes absent. Carapace uniformly covered with tubercles but without spines
.....*Palinurellus* van Martens.⁴
2. Supraorbital spine dorsally smooth. Abdominal somites never

⁴George and Main (1967) have placed this genus in the family Synaxidae.

- with more than one dorsal transverse groove; surface sometimes covered with a scaly sculpture 3.
- Supraorbital spine dorsally serrated. Abdominal somites with four to five transverse grooves; surface nonsculptured *Justitia* Holthuis.
3. Carapace almost prismatic in shape. In female pleopod II with well-developed appendix interna, equal in size to those of other pleopods 4.
- Carapace cylindrical. In female appendix interna of pereopod* II reduced (or absent) compared to other pleopods 6,
4. Antennules short; only third segment of peduncle reaches last segment of antennal peduncle. Pleopod I absent in female. Pereopods smooth or covered with short hairs 5.
- 97 — Antennules very long; first segment of peduncle extends beyond last segment of antennal peduncle. Pereopods covered with dense woolly-looking bristles. Supraorbital spines resemble expanded outgrowths with serrate anterior margin *Palinustus* A. Milne-Edwards.
5. Supraorbital spines confluent with median line of carapace *Linuparus* White
(only species: *L. trigonus* [von Siebold, 1824]).
- Supraorbital spines well separated *Puerulus* Ortmann.
6. Antennular flagella short, shorter than half length of peduncle. In female endopod of pereopod** II with well-developed appendix interna 7.
- Antennular flagella longer than peduncle. Supraorbital spines ventrally smooth. In female endopod of pleopod II without appendix interna *Panulirus* White.
7. Stridulatory organ at base of antenna absent. Anteroventral margin of supraorbital spine smooth 8.
- Stridulatory organ present. Anteroventral margin of supraorbital spine serrate *Palinurus* Fabricius.
8. Carapace with rounded sides and covered with a large number of almost similar spines. Abdomen smooth or covered with a scaly sculpture *Jasus* Parker.
- Carapace with angular sides and longitudinal crests armed with spines. Abdomen with median carina *Projasus* George and Grindley, 1964
(only species: *P. parkery* [Stebbing, 1902]).

*Error in original. Should read "In female appendix interna of pleopod II reduced"—Technical Editor.

**Error in original. Should read "In female endopod of pleopod II"—Technical Editor.

Genus *Jasus* Parker, 1884

KEY TO SPECIES

1. Transverse grooves present on dorsal surface of abdominal somites2.
- Transverse grooves absent on abdominal somites. Species found off Australia *J. verreauxi* (H. Milne-Edwards, 1851).
2. First somite of abdomen either fully or partially sculptured.3.
- First somite of abdomen entirely smooth. Species found off island of Juan-Fernandez (Chile)
..... *J. frontalis* (H. Milne-Edwards, 1837).
3. First somite of abdomen sculptured posteriorly only behind transverse groove4.
- First somite of abdomen sculptured throughout. Species found off South Africa *J. lalandii* (H. Milne-Edwards, 1837).
4. Sculpturing behind transverse groove of first somite of abdomen in form of a broad band covering almost entire posterior portion
.....5.
- Sculpturing behind transverse groove of first somite of abdomen restricted to a narrow strip6.
5. Abdominal somites II to VI entirely sculptured with convex scales. Scales numerous and small and arranged in four to five transverse rows. Only that part of somite covered by tergum of preceding one smooth. Species found off southwest coast of Australia and near Tasmania
..... *J. novaehollandiae* Holthuis, 1963.
- Abdominal somites II to VI sculptured with larger scales arranged in just two to three rows. Species found off New Zealand
..... *J. edwardsii* (Hutton, 1875).
6. Sculpturing on abdominal somites II to VI in form of a ribbon in middle of abdomen; anterior and posterior margins smooth. Species found near Tristan-de-Cunha Islands
..... *J. tristani* Holthuis, 1963.
- Abdominal somites II to VI without smooth anterior and posterior margins. Species found off San Paolo and Amsterdam
..... *J. paulensis* (Heller, 1863).

Genus *Palinurellus* van Martens, 1878

KEY TO SPECIES

1. Species found in West Indies *P. gundlachi* van Martens, 1878.
- Species found off Mauritius Island (Indian Ocean)
..... *P. wieneckii* (de Man, 1881).

Genus *Palinurus* Fabricius, 1798

KEY TO SPECIES

1. Spiny lobsters found in eastern Atlantic Ocean and Mediterranean Sea 2.
- Spiny lobsters found in Indian Ocean along southeastern coast of Africa, from Agulhas up to Mozambique
P. gilchristi Stebbing, 1898.
2. Spiny lobsters found along African coast and in Mediterranean Sea 3.
- Spiny lobsters found around Cape Green. Body color red. Bell-shaped pattern present on body, especially on pereopods
P. charlestoni Forest and Postel, 1964.
3. Pereopod I with false chela due to deep incision on distal end of propodus opposed to dactyl. Body color wine-red. Species found primarily in Mediterranean Sea and along African coast no farther south than Cape Bojador *P. elephas* (Fabricius, 1787).
- Pereopod I almost nonchelate since incision in distal part of propodus only in form of a small notch. Body color pink; appears marbled, especially on walking legs. Species found primarily near Africa, from the Canary Islands up to Cape Green; also found along northern African coast only up to Tunisia in the Mediterranean Sea *P. mauritanicus* Gruvel, 1911.

Genus *Palinustus* A. Milne-Edwards, 1881

KEY TO SPECIES

1. Median tooth present on anterior margin of carapace
P. truncatus A. Milne-Edwards, 1880.
- Median tooth absent on anterior margin of carapace
P. mossambicus Barnard, 1926.

Genus *Justitia* Holthuis, 1946

KEY TO SPECIES

1. Pereopod I slightly shorter than pereopod II and has a straight dactyl *J. japonica* (Kubo), 1955.
- Pereopod I significantly longer than pereopod II and has a considerably curved dactyl *J. longimana* (H. Milne-Edwards), 1837.

Genus *Puerulus* Ortmann, 1897

KEY TO SPECIES (FROM BERRY, 1969)

1. Postorbital spines absent. Tubercles on carapace well developed

- and nonpubescent. Eyes small and longer than broad2.
- Postorbital spines present. Tubercles on carapace low and pubescent. Eyes large and broader than long. *P. velutinus* Holthuis, 1963.
2. Two teeth situated between supraorbital horns and cervical grooves3.
- 99 — Three or more teeth situated between supraorbital horns and cervical grooves. Dactyl of pereopod* V does not form chela
- *P. angulatus* (Bate, 1888).
3. Median carina of carapace with three postcervical spines. Pereopod V chelate in male *P. carinatus* Borradaile, 1910.
- Median carina of carapace with five postcervical spines. Pereopod V nonchelate in male *P. sewelli* Ramadan, 1938.

Genus *Panulirus* White, 1847

KEY TO SPECIES

1. Exopod present on maxilliped III2.
- Exopod absent on maxilliped III11.
2. Exopod with flagellum on maxilliped III3.
- Exopod without flagellum on maxilliped III9.
3. Spiny lobsters found in Indian and Pacific Oceans4.
- Spiny lobsters found in Atlantic Ocean (east of American coast from Florida to Rio de Janeiro, and near Bermuda, Bahamas, and Antilles) *P. argus* (Latreille, 1804).
4. Spiny lobsters found in Indo-Pacific region but not found along Pacific coast of America. Transverse grooves on abdomen continuous5.
- Spiny lobsters found along Pacific coast of America. Transverse grooves on abdomen interrupted. . . . *P. interruptus* (Randall, 1839).
5. Transverse grooves on abdominal somites III and IV connected with respective grooves of pleura. Pleopods on abdominal somite II without endopod in male6.
- Transverse grooves on abdominal somites III and IV not connected with respective grooves of pleura. Pleopods on abdominal somite II with exopod and endopod (Figure 180)
- 100 *P. japonicus* (von Siebold, 1924).
6. Transverse grooves on abdominal somite II connected with grooves of pleura7.
- Transverse grooves on abdominal somite II not connected with grooves of pleura (Figure 181) *P. pascuensis* Reed, 1954.

*Omission in original. Should read "Dactyl of pereopod V in male does not form chela"—Technical Editor.

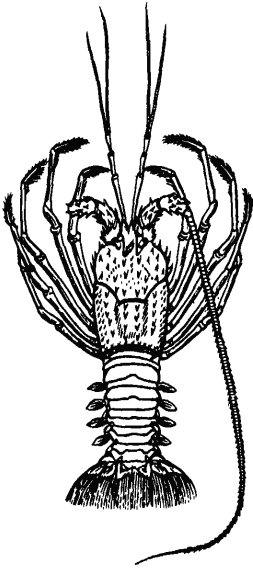


Figure 180. *Panulirus japonicus*
(from von Siebold, 1924).

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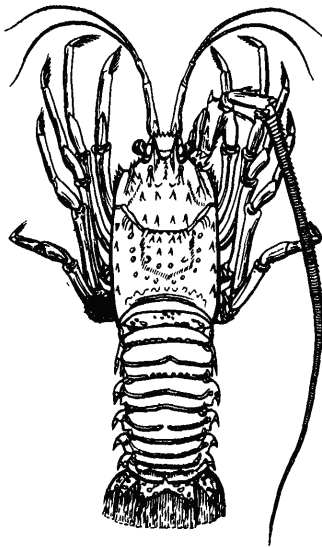


Figure 181. *Panulirus pascuensis*
Reed (female) (from George and
Holthuis, 1965).

- 7. Anterior margin of pleura of abdominal somite II edentate; abdomen with dorsal spots8.
- Anterior margin of pleura of abdominal somite II with a series of distinct teeth; abdomen with transverse stripes (Figure 182)
.....*P. marginatus* (Quoy and Gaimard, 1825).
- 8. Posterior margin of thoracic sternite in adult female with two dis-

- tinct teeth; posterior half of abdominal somite II without pubescent zone *P. longipes* (A. Milne-Edwards, 1868).
- Posterior margin of thoracic sternite in adult female edentate; pubescent zone present on abdominal somite II behind transverse groove in form of transverse belt (Figure 183)

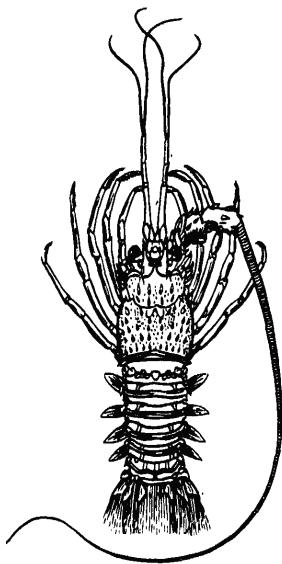


Figure 182. *Panulirus marginatus* (Quoy and Gaimard) (male) (from George and Holthuis, 1965).

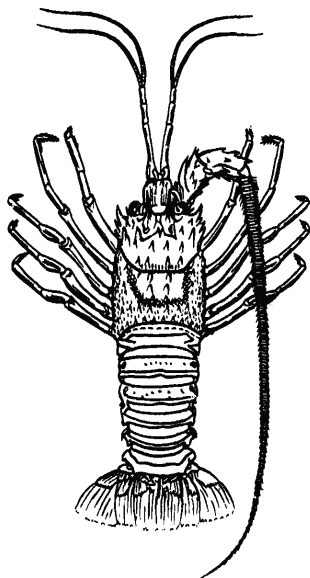


Figure 183. *Panulirus cygnus* George (male) (from George and Holthuis, 1965).

- *P. cygnus* George, 1862.
9. Antennular plate with one pair of spines. Species found in Atlantic Ocean 10.
 — Antennular plate with two pairs of spines connected by their bases. Species found in Indo-Pacific region
 *P. penicillatus* (Olivier, 1791).
10. Transverse grooves on abdominal somites II to V interrupted. One or more well-developed sharp teeth present on anterior margin of abdominal pleura *P. echinatus* Smith, 1869.
 — Transverse grooves on abdominal somites II to V continuous. At most, tubercles present on anterior margin of pleura of abdominal somites I to V, which are very rarely pointed
 *P. guttatus* (Latreille, 1804).
11. Exopod of maxilliped II with well-developed flagellum 12.
 — Exopod of maxilliped II without flagellum or with a reduced one 14.
12. Spiny lobsters found in Atlantic Ocean 13.
 — Spiny lobsters found in Indo-Pacific region
 *P. polyphagus* (Herbst, 1793).
13. Transverse grooves absent on dorsal side of abdominal somites. Species distributed throughout western Atlantic Ocean
 *P. laevicauda* (Latreille, 1817).
 — Interrupted transverse grooves present on dorsal side of abdominal somites. Species distributed throughout eastern Atlantic Ocean ...
 *P. rissonii* (Desmarest, 1825).
14. Exopod of maxilliped II without flagellum 15.
 — Exopod of maxilliped II with reduced flagellum
 *P. homarus* (L., 1758)—(*P. bürgeri* de Haan, 1841—
P. dasyopus Latreille, 1804).
15. Spiny lobsters found along Pacific coast of America 16.
 — Spiny lobsters found in Indo-Pacific region, but never along Pacific coast of America 17.
16. Small number of scattered, but not highly raised spines on carapace. Three large spines occur in hepatic region of carapace and one small spinule above posterior spine. *P. gracilis* Streets, 1871.
 — Numerous highly raised spines on carapace. In addition to three large spines in hepatic region, three to four smaller ones also present *P. inflatus* (Bouvier, 1895).
17. Groove in front of posterior margin of carapace at least equal in width to marginal crest and broad in the middle. Abdomen with narrow transverse dull stripes or without them 18.
 — Groove in front of posterior margin of carapace narrower than marginal crest and almost the same width throughout its length. Abdomen smooth, without narrow transverse dull stripes

-*P. ornatus* (Fabricius, 1798).
18. Abdominal somites with well-developed lower pubescent regions. Pleopod V in male twice as long as wide. Uniform small dots scattered over abdomen and no transverse dull stripes
.....*P. simpsoni* Holthuis, 1963.
- Abdominal somites without lower pubescent regions or with poorly defined ones. Pleopod V in male approximately three times as long as wide. Abdomen with narrow transverse dull stripes
.....*P. versicolor* Latreille, 1804.

FAMILY SCYLLARIDAE WHITE, 1847

KEY TO GENERA

1. Body moderately depressed. Carapace equal in length to width . . .2.
— Body highly depressed and discoid. Carapace width greater than length4.
2. Exopod of maxilliped III with flagellum; 21 branchiae present . . .3.
— Exopod of maxilliped III without flagellum; 19 branchiae present ..
.....*Scyllarus*.
- 102 3. Abdominal somite I with transverse continuous groove. Distal segment of antenna with large number of distinct teeth*Arctides*.
— Abdominal somite I without transverse groove. Distal segment of antenna edentate*Scyllarides*.
4. Eyes located between median line of body and outer corners of carapace5.
— Eyes located nearer outer corners of carapace*Thenus*
(only species: *T. orientalis* [Lund]).
5. Eyes located nearer to median line than to outer corners of carapace*Ibacus*.
— Eyes located midway between median line and outer corners of carapace*Parribacus*.

Genus *Ibacus* Leach, 1815

KEY TO SPECIES

1. Species not found near New Zealand2.
— Species found near New Zealand and Chatham Islands
.....*I. alticrenatus* Bate, 1888.
2. Inner side of merus of maxilliped III divided by incomplete grooves into septa3.
— Inner side of merus of maxilliped III not divided into septa
.....*I. ciliatus* (von Siebold, 1824).
3. Septa of distal end of merus of maxilliped III do not bulge4.

- Septa of distal end of merus of maxilliped III in form of rounded knobs *I. verdi* Bate, 1888.
- 4. All three anterior teeth on epistome directed ventrally. Branchial carina behind cervical groove highly raised. . . *I. peronii* Leach, 1815.
- Only posterior tooth of three anterior ones on epistome directed ventrally, other two directed anteriorly. Branchial carina behind cervical groove straight. *I. novemdentatus* Gibbes, 1850.

Genus *Arctides* Holthuis, 1960

KEY TO SPECIES

- 1. Species found in Indo-Pacific region 2.
- Species found in Atlantic Ocean *A. guineensis* (Spengler, 1799).
- 2. Species found near Hawaiian Islands. *A. regalis* Holthuis, 1963.
- Species found near New Zealand and eastern Australia
 *A. antipodarum* Holthuis, 1960.

Genus *Parribacus* Dana, 1852

KEY TO SPECIES

- 1. Rostrum dentate 2.
- Rostrum edentate 4.
- 2. Fourth segment of antenna usually armed with six teeth along outer margin (excluding tip of segment) 3.
- Fourth segment of antenna usually armed with seven teeth along outer margin (excluding tip of segment)
 *P. caledonicus* Holthuis, 1960.
- 3. Abdominal somite I with five red spots along posterior margin; spots absent anteriorly *P. scarlatinus* Holthuis, 1960.
- Abdominal somite I with 8 to 10 red spots anteriorly
 *P. perlatus* Holthuis, 1967.
- 4. Anterior half of abdominal somites II to V almost smooth, with a few reticulate grooves. 5.
- Anterior half of abdominal somites II to V covered with a large number of close-set tubercles. *P. antarcticus* (Lund, 1793).
- 5. Abdominal somite I with 8 to 10 irregularly scattered and brightly colored spots. Species found near Haiti and Tuamotu Islands
 *P. holthuisi* Forest, 1954.
- Abdominal somite I with five bright spots, of which one small spot median and four large spots lateral, two on each side. Species found along coast of Japan *P. japonicus* Holthuis, 1960.

Genus *Scyllarides* Gill, 1898

KEY TO SPECIES

1. Spiny lobsters found in Atlantic Ocean2.
- Spiny lobsters found in Indo-Pacific region8.
2. Spiny lobsters found in eastern Atlantic Ocean and Mediterranean Sea3.
- Spiny lobsters found in western Atlantic Ocean4.
3. Carapace sparsely pubescent and body relatively smooth. Anterior half of abdominal somite I with three large red spots of approximately the same shape*S. herklotsi* (Herklots, 1851).
- Carapace densely pubescent and highly granular. Anterior dorsal half of abdominal somite I with median dark red spot surrounded by a light-colored yellowish ring and two semilunar spots along sides; concave side of spots directed toward median spot*S. latus* (Latreille, 1803).
4. Basal part of posterior margin of pleura of abdominal somite II distinctly concave5.
- Basal part of posterior margin of pleura of abdominal somite II distinctly convex*S. brasiliensis* Rathbun.
5. One round bright red spot each side of dorsal surface of abdominal somite I*S. deceptor* Holthuis, 1963.
- Pattern of abdominal somite I differs from one described above . .6.
6. Abdominal somites II to IV without median crest7.
- Abdominal somites II to IV with median crest*S. nodifer* (Stimpson, 1866).
7. Branchial region of carapace with longitudinal row of large tubercles. One large round red spot in center of abdominal somite I. Midway between this spot and base of pleura another small spot occurs, which is roughly triangular in shape*S. delfosi* Holthuis, 1960.
- Branchial region of carapace without longitudinal row of large tubercles. Four large red spots on abdominal somite I arranged symmetrically in relation to axial line*S. aequinoctialis* (Lund), 1793.
8. Basal part of posterior margin of pleura of abdominal somite II distinctly concave9.
- Basal part of posterior margin of pleura of abdominal somite II distinctly convex*S. squamosus* (H. Milne-Edwards, 1837).
9. Abdominal somites II to IV with crests. Spiny lobsters not found off Galapagos Islands10.
- Abdominal somites II to IV without crests. Spiny lobsters found off Galapagos Islands*S. astori* Holthuis, 1960.

10. Crest of abdominal somite IV does not form a very high ridge. . . 11.
 — Crest of abdominal somite IV forms a very high ridge
 *S. haami* (de Haan, 1841).
- 104 11. Spiny lobsters not found off southeastern coast of Africa 12.
 — Spiny lobsters found off southeastern coast of Africa
 *S. elisabethae* (Ortmann, 1894).
12. Pregastric tooth on carapace with single tip. Species found in central
 region of Pacific Ocean (Easter Island)
 *S. roggeveeni* Holthuis, 1967.
 — Pregastric tooth on carapace bifid. Species found in the Red Sea . . .
 *S. tridacnophaga* Holthuis, 1967.

Genus *Scyllarus* Fabricius, 1775

KEY TO SPECIES

1. Species found in Indo-Pacific region 11.
 — Species found in Atlantic Ocean 2.
2. Species found in western Atlantic Ocean 8.
 — Species found in eastern Atlantic Ocean (including Mediterranean
 Sea) 3.
3. Rostral teeth well developed and raised 4.
 — Rostral teeth very small or absent 6.
4. Pleura of abdominal somite II sharp and curve dorsally. Anterior
 part of abdominal somites overlapped by preceding somite, without
 a transverse groove, and covered with backwardly directed hairs.
 5.
 — Pleura of abdominal somite II obtuse and curve ventrally. Anterior
 part of abdominal somites overlapped by preceding somite, with a

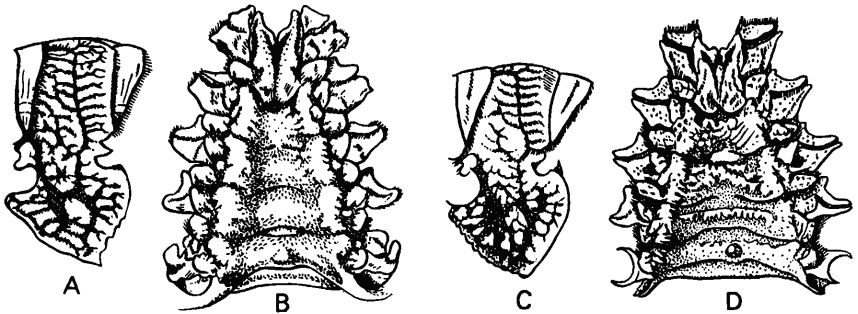


Figure 184. *Scyllarus arctus* (L.): A—abdominal somite II and smooth part of abdominal somite III. (lateral view); B—sternite of cephalothorax (ventral view); C and D—*Scyllarus pygmaeus* (Bate) (legend same as above) (from Forest and Holthuis, 1960).

- distinct transverse groove, and covered with backwardly directed hairs (Figure 184, *C* and *D*) *S. pygmaeus* Bate, 1888.
5. Tip of first tooth of median carina of carapace (pregastric tooth) located slightly closer to second (gastric) tooth than to rostrum. Gastric tooth slightly above remaining teeth of median carina. Median tubercle of thoracic sternite small and conical (Figure 184, *A* and *B*) *S. arctus* (L.), 1758.
- Tip of pregastric tooth slightly closer to tip of rostrum than to gastric tooth. Gastric tooth much above remaining teeth of median carina. Median tubercle of thoracic sternum V quite large, broad, and with a ridge on anterior margin *S. subarctus* Crosnier, 1969.
- 105 6. Anterior margin of thoracic sternum forms two large lobes divided by a small cleft. Median carina of abdominal somites II, III, and IV high and raised (Figure 185) *S. caparti* Holthuis, 1952.
- Anterior margin of thoracic sternum with a broad cleft and straight or concave margins. Median carinae of abdomen not high but

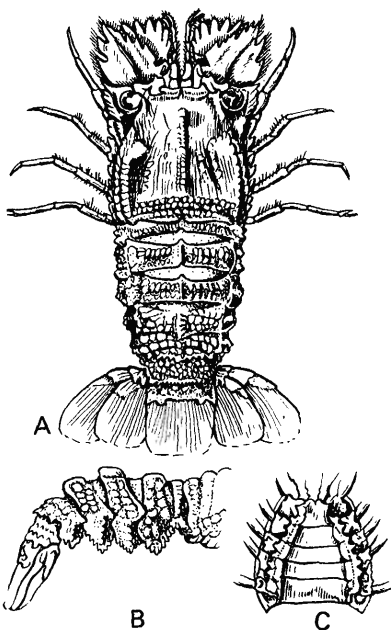


Figure 185. *Scyllarus caparti* Holthuis.

A—dorsal view; *B*—abdomen (lateral view); *C*—thoracic sternites (ventral view) (from Holthuis, 1952).

- mildly raised 7.
7. Median tubercle of last thoracic sternum small. Anterior tooth of inner margin of orbit longer than posterior one (Figure 186) *S. paradoxus* Miers, 1881.

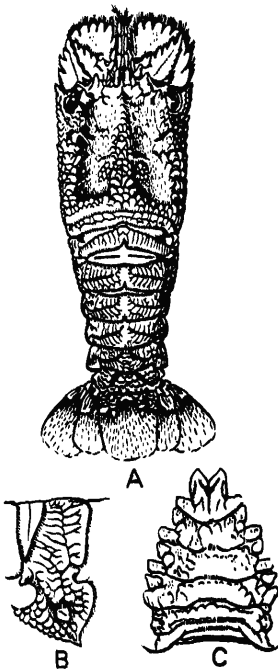


Figure 186. *Scyllarus paradoxus*
Miers.

A—dorsal view; B—abdominal somite II (lateral view); C—thoracic sternites (ventral view).

- Median tubercle of last thoracic sternum sharp and curves backward; in male additional pair of large lateral teeth present. Anterior tooth of inner margin of orbit shorter than posterior one (Figure 187) *S. posteli* Forest, 1963.
- 8. Abdominal somites I to IV with a small rounded cleft in middle of posterior margin 9.
- Abdominal somites I to IV with a deep sharply pointed cleft in middle of posterior margin 10.
- 9. Inner margin of orbit with two sharp, strong teeth
..... *S. chacei* Holthuis, 1960.
- Inner margin of orbit smooth *S. planorbis* Holthuis, 1969.
- 106 10. Second segment of antennular peduncle dorsally flat. Abdominal somite IV with a carinate area *S. americanus* (Smith, 1896).
- Second segment of antennular peduncle cylindrical. Abdominal somite IV without carinate area *S. nearctus* Holthuis, 1960.
- 11. Species not found off Juan Fernandez Islands 12.
- Species found off Juan Fernandez Islands
..... *S. delfini* (Bouvier), 1909.
- 12. Large distoventral tooth present on propodus of pereopod III, giving it a subchelate appearance 13.
- Distoventral tooth absent on propodus of pereopod III; tip appears normal 14.

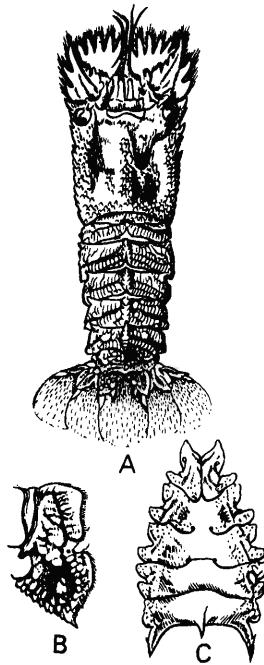


Figure 187. *Scyllarus posteli*
Forest. *A*—dorsal view; *B*—abdominal somite II (lateral view); *C*—thoracic sternites (ventral view) (from Forest, 1963).

13. Second tooth of median carina of carapace very high, much higher than the first one *S. cultrifer* (Ortmann), 1897.
— Second tooth of median carina of carapace not very high, only slightly higher than the first one *S. aureus* Holthuis, 1963.
14. Abdominal somites with tuberculate sculpture 15.
— Abdominal somites smooth or with dendroid or scaly sculpture 17.
15. Outer margin of second segment of antenna with not less than four (four to seven) teeth 16.
— Outer margin of second segment of antenna with just three teeth *S. brevicornis* Holthuis, 1946.
16. Posterior margin of sternum of thoracic somite V with series of tubercles. Posterior half of abdominal pleura without tubercles *S. rugosus* H. Milne-Edwards, 1837.
— Posterior margin of sternum of thoracic somite V without tubercles. Posterior half of abdominal pleura with longitudinal row of tubercles *S. demani* Holthuis, 1963.
17. Median carina present on abdominal somites II to V. 18.
— Median carina absent on abdominal somites II to V. 27.
18. Abdominal terga with more or less distinct dendroid or scaly sculpture 19.
107 — Abdominal terga smooth, without dendroid or scaly sculpture.

- Crest on abdominal somite II higher than that of other somites.
Species found near New South Wales (Australia)
. *S. crenatus* (Whitelegge), 1900.
19. Antennal squame divided by two oblique crests 20.
— Antennal squame divided by just one oblique crest 21.
20. Scaly sculpture on abdomen prominent only on somite VI and on
pleura *S. rubens* (Alcock and Anderson), 1894.
— Scaly sculpture well defined throughout abdomen
. *S. martensi* Pfeffer, 1881.
21. Tooth either present or absent on last thoracic sternite; if present, in
form of small obtuse tubercle 22.
— Large sharp tooth present on last thoracic sternite
. *S. ornatus* Holthuis, 1960.
22. Crests on abdominal somites II to V approximately equal in
height 26.
— Crest on one of these somites much higher than on others 23.
23. Crest on abdominal somite III higher than those on other
somites 24.
— Crest on abdominal somite IV higher than those on other somites. .
. *S. gibberosus* (de Man), 1905.
24. Rostral tooth present 25.
— Rostral tooth absent. Species found in the Red Sea
. *S. lewinoehni* Holthuis, 1967.
25. Abdominal somite I smooth. Species found around Fiji Islands,
northern coast of Celebes, and near Ambionia Island
. *S. vitiensis* (Dana), 1852.
— Large number of curved and branched longitudinal grooves present
on abdominal somite I. Species found near Sulu Archipelago
(Philippines) *S. aesopius* Holthuis, 1960.
26. Longitudinal grooves on terga of abdominal somite I partly curved
and branched. Species found near Hawaiian Islands
. *S. modestus* Holthuis, 1960.
— Longitudinal grooves on terga of abdominal somite I straight and
unbranched. Species found in Japan and near Sumbawa Island
(Flores Sea) *S. bicuspidatus* (de Man), 1905.
27. Second median tooth of carapace, if higher than other median teeth,
only slightly so 28.
— Second median tooth of carapace much higher than other teeth.
Species found near Sulu Archipelago (Philippines) and Hawaiian
Islands *S. timidus* Holthuis, 1960.
28. Propodus of pereopods II and III broad and laterally
compressed 29.
— Propodus of pereopods II and III not broad and very slightly
compressed 30.

29. Anterior unsculptured part of terga of abdominal somite II smooth, without transverse groove. *S. batei* (Bate), 1888.
 — Anterior unsculptured part of terga of abdominal somite II with two parallel transverse grooves. *S. bertholdi* Paulson, 1875.
30. Typical dendroid pattern found on abdominal somites II to IV 31.
 — Pattern on abdominal somites II to IV in form of simple loop with straight lateral margins. Species found in Red Sea, near Madagascar, and near Mauritius Island *S. pumilus* Nobili, 1906.
31. Rostrum distinctly dentate; large, compressed, triangular cardiac tooth present 32.
 — Rostrum edentate; cardiac tooth very low, short, and bifid. Species found off Australia *S. amabilis* Holthuis, 1963.
32. Additional transverse groove absent between posterior marginal groove of carapace and its posterior margin. Median tubercle present on last thoracic sternite *S. dubius* Holthuis, 1963.
 — Additional transverse groove present between posterior marginal groove of carapace and its posterior margin. Median tubercle not present on last thoracic sternite. *S. sordidus* (Stimpson), 1860.

Section ASTACURA Borradaile, 1907

KEY TO FAMILIES (FROM BALSS, 1957)

1. Last thoracic somites free and movable 2.
 — Last thoracic somites fused with preceding ones Family **Homaridae**.
2. Podobranchiae without lamina but stems may be alary; short falcate structures originate from ends of joints. Pleopods I absent in both sexes 3.
 — Podobranchiae with broad bilobate lamina; falcate structures originate from ends of joints. Pleopod I present in both sexes Family **Astacidae**.
3. Antennules with well-developed flagella. Carapace not broad from below Family **Parastacidae**.
 — Antennular flagella either reduced or absent. Carapace broad from below Family **Austroastacidae**.

FAMILY HOMARIDAE

KEY TO GENERA (FROM MANNING, 1969)

1. Eyes present. Pleura of abdominal somites III to VI triangular . . 2.

- Eyes absent. Pleura of abdominal somites III to VI rectangular . . .
 *Thaumastocheles*.
- 2. Scaphocerites present 3.
- Scaphocerites absent 7.
- 3. Scaphocerites foliate. Carapace with longitudinal carina 4.
- Scaphocerites triangular; tips sharp. Carapace without carina
 *Homarus*.
- 4. Eyes pigmented 5.
- Eyes nonpigmented *Neophoberus*
 (one species: *N. caecus* A. Milne-Edwards).
- 5. Propodus of chela with longitudinal carina. Carapace with paired
 postcervical rows of spines along median line 6.
- Propodus of chela without longitudinal carina. Carapace without
 paired postcervical rows of spines along median line *Enoplometopus*.
- 6. Carapace without submedian carina behind cervical groove
 *Eunephrops*.
- Carapace with submedian carina behind cervical groove
 *Nephrops*.
- 7. Eyes nonpigmented. Pleura of abdominal somite II triangular
 *Nephropsis*.
- Eyes pigmented. Pleura of abdominal somite II rounded rec-
 tangles *Nephropides*.

Genus *Homarus* Weber, 1795

KEY TO SPECIES

- 1. Species distributed in eastern Atlantic and southwestern Indian
 Oceans 2.
- Species distributed along Atlantic coast of North America and
 region from Labrador to Carolina
 *H. americanus* H. Milne-Edwards.
- 2. Species distributed in European waters up to Tromsø (Norway) in
 the north and along coasts of France and Portugal, in Mediter-
 ranean and Black Seas, and off northwestern coast of Africa
 *H. gammarus* (L.).
- Species found only off southern Africa, from Cape of Good Hope up
 to Gulf of Algoa *H. capensis* (Herbst).

Genus *Eunephrops* Smith, 1885

KEY TO SPECIES

- 1. Spines present on posteromedian margin of cervical suture of
 carapace. Second segment of antennal peduncle unarmed

-*E. bairdii* Smith, 1885.
 — Spines absent on posteromedian margin of cervical suture of carapace. Second segment of antennal peduncle with anterolateral spines*E. cadenasi* Chace, 1939.

Genus *Enoplometopus* A. Milne-Edwards, 1862

KEY TO SPECIES

1. Postcervical spines (one or two) present on carapace2.
 — Postcervical spines absent on carapace
*E. pictus* A. Milne-Edwards.
 2. One postcervical spine present3.
 — Two postcervical spines present*E. holthuisi* Gordon.
 3. Spines present on pleura of abdominal somites III to V4.
 — Spines absent on pleura of abdominal somites III to V
*E. occidentalis* (Randall).
 4. Pleura of abdominal somite VI rounded; only two teeth present on posterior transverse margin of this somite ...*E. antillensis* Lütken.
 — Pleura of abdominal somite VI sharp; six teeth present on posterior margin of somite, one of which larger and located medially
*E. biafri* Burukovksy, 1972.

Genus *Nephropsis* Wood-Mason, 1872

KEY TO SPECIES (FROM BOUVIER, 1917)

1. Median crest present on terga of abdominal somites II to VI ...2.
 — Median crest absent on terga of abdominal somites II to VI6.
 2. Rostral spines present3.
 — Rostral spines absent; pair of postrostral spines present. Anterior margin of epimera of abdominal somites unarmed. Epimera of abdominal somites II to V with long lower ends
*N. ensirostris* Alcock, 1901.
 3. Only one pair of rostral spines present4.
 — Several spines present: at least two pairs of rostral spines, one pair of postrostral spines, one spine on anterior margin of each epimeron of abdominal somite II, and one pair of hepatic spines, rarely rudimentary*N. atlantica* Norman, 1882.
 4. Hepatic spines not present. Lower ends of epimera of abdominal somites II to V very short5.
 — One pair of hepatic spines present, sometimes rudimentary. Epimera of abdominal somites II to V with long ends
*N. aculeata* Smith, 1881.
 5. Dorsal spine present near base of telson

- *N. occidentalis* Faxon, 1895.
- Dorsal spine absent on telson *N. carpenteri* Wood-Mason, 1885.
- 6. Rostrum with at least two pairs of spines. Epimera of abdominal somites II to V with long lower ends 7.
- Rostrum with only one pair of spines. Epimera of abdominal somites II to V with short lower ends and anterior margin unarmed. Transverse suture present on exopod of uropod
- *N. stewarti* Wood-Mason, 1873.
- 7. Transverse suture present on exopod of uropod 8.
- Transverse suture absent on exopod of uropod. Spine present on anterior margin of epimera of somites II to V . . . *N. suhmi* Bate, 1888.
- 110 8. Anterior margin of epimera of abdominal somite II armed with spine. Hepatic spine absent *N. malhaensis* Borradaile, 1910.
- Anterior margin of epimera of abdominal somites II, III, and IV armed with spine. Hepatic spine present
- *N. agassizi* A. Milne-Edwards, 1880.

Genus *Nephropides* Manning, 1969

KEY TO SPECIES

- 1. Median crest absent on abdomen *N. caribbaeus* Manning.
- Median crest present on abdomen (Figure 188)
- *N. birsteini* Zarenkov and Semjonov.

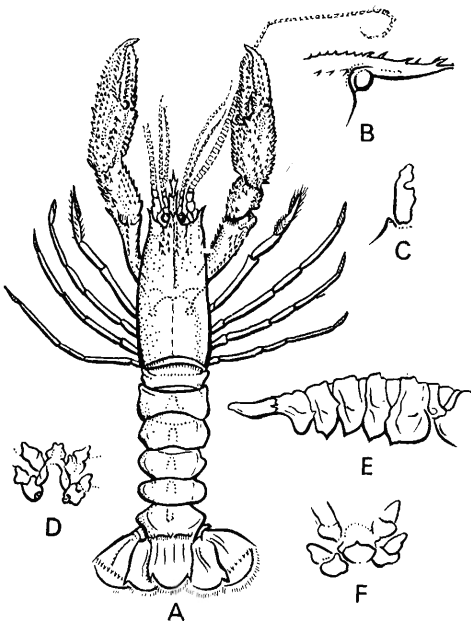


Figure 188. *Nephropides birsteini* Zarenkov and Semjonov.

A—general (dorsal view),
 B—rostrum (lateral view);
 C—pleopod I of male; D—base
 of pereopods IV and V of male;
 E—abdomen (lateral view);
 F—base of pereopods IV and V
 of female (from Zarenkov and
 Semenov, 1972).

Genus *Nephrops* Leach, 1815

KEY TO SPECIES

1. Carapace with seven longitudinal carinae behind cervical groove. Dorsolateral margin of rostrum continues onto carapace in the form of a postrostral carina. Antennal spines large. Scaphocerite semi-circular and broad 2.
- Carapace with five longitudinal carinae behind cervical groove. Dorsolateral margin of rostrum does not continue onto carapace. Antennal spines small. Scaphocerite narrow and lanceolate
..... *N. norvegicus* (Linne, 1875).
2. Species found in Atlantic Ocean (western Atlantic) 3.
- Species found in Indo-Pacific region 4.
- 3.* Spinules absent between rows of postrostral teeth. Margin above base of pleura of abdominal somites III to V unarmed
..... *N. binghami* Boone, 1927.
- Spinules present between rows of postrostral teeth. Margin above base of pleura armed with spine on abdominal somites III to V ...
..... *N. rubellus* Moreira, 1903.
4. Carapace covered with spines 5.
- Carapace smooth or covered with small granules 7.
5. One pair of transverse grooves on each terga of abdominal somites II and III (same part of terga) which do not extend under preceding somite on bending the abdomen 6.
- Terga of abdominal somites II and III with two pairs of transverse grooves each *N. neptunus* Bruce, 1965.
6. Each groove with complex lateral margins, pubescent anterior and posterior margins, smooth floor, and transverse row of granules. Additional groove connects in middle of anterior margin with lateral end of groove, separating jointed and nonjointed surface of terga ..
..... *N. arafurensis* de Man, 1905.
- 111 — Each groove simple and entirely pubescent
..... *N. australiensis* Bruce, 1966.
7. No longitudinal raised spinescent crests on chelae of pereopod I 8.
- Longitudinal raised spinescent crests present on chelae of pereopod I 12.
8. Transverse pubescent grooves present on some abdominal somites 9.
- Transverse pubescent grooves absent on abdominal somites ... 10.

*According to Manning (1969) *N. binghami* is armed with one spine and *N. rubellus* is unarmed—Technical Editor.

- 9. Distinct transverse grooves present on first five abdominal somites. Thick tufts of setae present on ventromedian sides of dactyl of cheliped I *N. sinensis* Bruce, 1966.
- Transverse grooves distinct only on abdominal somites II to III, poorly developed on abdominal somites IV to V, and absent on abdominal somite I. Dactyl of cheliped I without ventromedian setae *N. thomsoni* Bate, 1888.
- 10.*Spines present on longitudinal crest in cardiac region of carapace 11.
- Spines absent on longitudinal crest in cardiac region of carapace *N. challengerii* Balss, 1914.
- 11. Distinct tooth present midlength of inner margin of merus of cheliped I. Scaphocerite with maximum width in middle third (Figure 189) *N. boschmai* Holthuis, 1964.
- Distinct tooth absent among small spines on inner margin of merus of cheliped I. Scaphocerite with maximum width in distal third *N. sibogae* de Man, 1916.

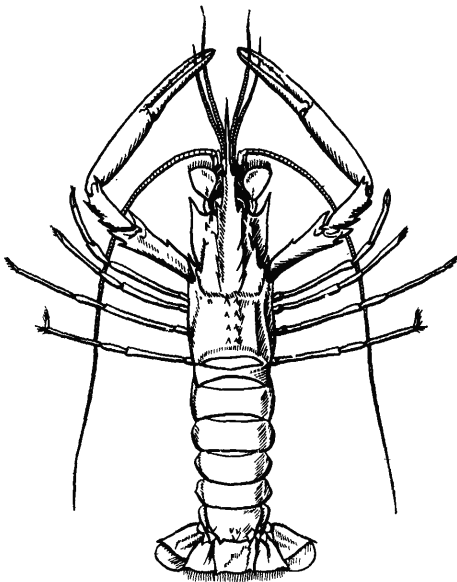


Figure 189. *Nephrops boschmai* Holthuis (from Holthuis, 1964).

- 12. Two pairs of small spines present on abdominal somite VI.
 *N. japonicus* Tapparone Canefri, 1873
 (? *N. sagamiensis* Parisi, 1917—*N. intermedium* Balss, 1921).

*According to Manning (1969) the presence or absence of a “spinescent longitudinal crest” is an important diagnostic character—Technical Editor.

- Spines absent on abdominal somite VI
 *N. andamanicus* Wood-Mason, 1892.

Genus *Thaumastocheles* Wood-Mason, 1874

KEY TO SPECIES

1. Species found off West Indies
 *T. zaleucus* (Willemoes-Suhm, 1875).
 — Species found off Japan *T. japonicus* Bate, 1888.

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INDEX*

- Acanthephyra* 55
 —*purpurea* 55
Albunea 7
Allocaris 63
Alope 79
 —*orientalis* 79
 Alpheidae 54, 74
Alpheopsis 75
 —*equalis truncatus* 75
Alpheus 77
 —*glaber* 77
Ambidexter 86
Amphibetaeus 77
 —*jousseaume* 76
Anapontonia 69
Anchistioides 71
 —*willeyi* 72
Anchistus 69
 —*custos* 69
Anomura 10, 95
Antecaridina 58
 —*lauensis* 58
 Appendix
 —*interna* 10
 —*masculina* 10
Arctides 102
 —*antipodarum* 102
 —*guineensis* 102
 —*regalis* 102
Arete 76
 —*dorsalis* 76
Aretopsis 76
 —*amabilis* 76
Aristeinac 15, 47
Aristaeomorpha 13, 47
 —*foliacea* 47
Aristeus 13, 47, 48
 —*alcocki* 48
 —*antennatus* 49
 —*antillensis* 49
 —*mabahisse* 49
 —*occidentalis* 49
 —*semidentatus* 49
 —*varidens* 48
 —*virilis* 48
Artemesia 16
 —*longinaria* 16
 Astacidae 108
Astacura 9, 10, 11, 95, 108
Athanopsis 76
 —*platyrhynchus* 76
Athanas 76
 —*nitescens* 75
Atya 58
 —*crassa* 58
Atyaephyra 57
 —*desmaresti* 57
Atyella 59
 —*brevirostris* 59
Atyidae 9, 53, 56
Atypopeneaeus 17, 28
 —*dearmatus* 29
 —*formosus* 28, 29
 —*stenodactylus* 29
 Austroastacidae 108
Austropandalus 85
 —*grayi* 85
Automate 76
 —*anacanthopus* 76
 Axiidae 10

Balssia 73
 —*gasti* 73
Barbouria 79
 —*cubensis* 80
Batella 77

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—*parvimanus* 77
Bathypalaemonella 62
 —*zimmeri* 62
Bentheogennema 46, 47
 —*borealis* 47
 —*intermedia* 47
 —*pasithea* 47
Benthesicyminae 15, 46
Benthesicymus 12, 46
Benthonectes 47
 —*filipes* 47
Betaeus 76
 —*truncatus* 76
Birulia 79
 —*kishinouyei* 80
Brachycarpus 65
 —*biunguiculatus* 66
Brachyura 7, 10, 95
Bresilia 61
 —*atlantica* 62
Bresiliidae 53, 62
Bythocaris 83
 —*leucopis* 82

Campylonotidae 53, 62
Campylonotus 62
 —*rathbunae* 62
Cancer 12
Caridea 14, 52
Caridella 59
 —*cunnigtoni* 58
Caridina 59
 —*acuminata* 58
Caridinides 58
 —*wilkinsi* 58
Caridinopsis 59
 —*chevallieri* 59
Caridion 79
 —*gordoni* 80
Cavicheles 71
 —*kempi* 72
Chlorotocella 86
 —*gracilis* 86
Chlorotocoides 86
 —*spinicauda* 85
Chlorocurtis 86
 —*juctans* 86
Chlorotocus 86
 —*novae-zealandiae* 85
Chorismus 79
 —*antarcticus* 80

Conchodites 70
 —*monodactylus* 71
Coralliocaris 70
 —*superba* 71
Coutierea 73
 —*agassizi* 73
Crangon 88
 —*dalli* 88
Crangonidae 54, 86
Creaseria 64
 —*morleyi* 63
Cryphiops 65
 —*caementarius* 66
Cryptocheles 80
 —*pygmaea* 81

Dantecia 60
 —*caudani* 60
Dasella 70
 —*hermaniae* 71
Dasycaris 70
 —*ceratops* 70
Decapoda 4, 15
Desmocarid 63
 —*trispinosa* 63
Dichelopandatus 84
 —*leptoceras* 84
Disciadiidae 53
Discias 53
Dorodotes 83
 —*reflexus* 83
Dromia 4
Dromiacea 11
Dromiidae 11
Dugastella 57
 —*marocana* 58

Engystenopus 92, 93
 —*palmipes* 91, 93
 —*spinulatus* 93
Enoplometopus 6, 108, 109
 —*antillensis* 109
 —*biafri* 109
 —*holthuisi* 109
 —*occidentalis* 109
 —*pictus* 109
Ephyrina 55
 —*hoskyni* 56
Eryonidea 95
Eulus 80
 —*gaimardi* 81

- Eucyphidea 8, 9, 10
Eugonatonotus 61
 —*crassus* 61
Eunephrops 108, 109
 —*bairdii* 109
 —*cadenasi* 109
Eupagurus 12
Eupasiphaë 60
 —*latirostris* 60
Eupontonia 66
 Euryrhynchinae 62
Euryrhynchus 62
Exopalaemon 65
 —*shylicherus* 64

Fennera 70
 —*chacei* 70
Funchalia 16, 24
 —*balboae* 24
 —*danae* 24
 —*taaningi* 25
 —*villosa* 25
 —*woodwardi* 24

 Galatheidae 6
 Galatheidea 9, 11
Gelastocaris 82
 —*paronae* 81
 Gennadas 46
Glyphocrangon 54
 Glyphocrangonidae 54
Glyphus 60
 Gnathophyllidae 53, 73
Gnathophylloides 74
 —*mineri* 74
Gnathophyllum 74
 —*panamense* 74
Gordonella 46
 —*polyarthra* 46

Haliporus 43, 44
 —*curvirostris* 44
 —*thetis* 44
Hamodactylus 71
 —*boschmai* 72
Hamopontonia 69
Harpiliopsis 70
 —*depressus* 70
Harpilius 67
 —*brevicarpus* 68
Hemipenaeus 47, 48
 —*carpenteri* 48
 —*crassipes* 48
 —*gracilis* 48
 —*sibogae* 48
 —*speciosus* 48
 —*spinidorsalis* 48
Hepomadus 47
 —*gladialis* 47
 —*tener* 47
Heptacarpus 80
 —*minutus* 79
Heterocarpoides 85
 —*levicarina* 85
Heterocarpus 85
 —*sibogae* 85
 Hippidae 11
Hippolysmata 83
 —*ensirostris* 83
 —*prima* 83
 —*vittata* 82
Hippolyte 80
 —*varians* 81
 Hippolytidae 7, 54, 78
 Homaridae 108
Homarus 6, 8, 108
 —*americanus* 108
 —*capensis* 108
 —*gammarus* 108
Homola 4
Hymenocera 74
 —*elegans* 75
Hymenodora 55
 —*gracilis* 56
Hymenopenaeus 43, 45
 —*aequalis* 46
 —*aphoticus* 46
 —*chacei* 46
 —*debilis* 46
 —*diomedea* 45
 —*doris* 45
 —*fattachi* 46
 —*halli* 46
 —*laevis* 45
 —*lucasii* 45
 —*modestus* 45
 —*mülleri* 45
 —*neruus* 45
 —*neptunus* 46
 —*obliquirostris* 46
 —*propinquus* 46
 —*robustus* 45
 —*sewelli* 46
 —*sibogae* 45

- taprobanensis* 45
- tropicalis* 45
- villosus* 45

- Ibacus* 102
 - alticrenatus* 102
 - ciliatus* 102
 - novemdentatus* 102
 - peronii* 102
 - verdi* 102
- Ischnopontonia* 69

- Jasus* 97
 - edwardsii* 97
 - frontalis* 97
 - lalandii* 97
 - novae-hollandiae* 97
 - paulensis* 97
 - tristani* 97
 - verrauxi* 97
- Jocaste* 70
 - lucina* 71
- Justitia* 96, 98
 - japonica* 98
 - longimana* 98

- Latreutis* 82
 - mucronatus* 82
- Leander* 64
 - urocaridella* 63
- Leandrites* 63
 - celebensis* 63
- Lebbeus* 79
 - polaris* 80
- Leucosiidae 9
- Leontocaris* 79
 - lar* 81
- Leptocarpus* 65
 - fluminicola* 65
- Leptochela* 61
 - bermudensis* 61
- Leuciferinae 16
- Ligur* 78
 - ensifer* 78
- Limnocaridella* 60
 - aeberti* 59
- Limnocaridina* 60
 - tanganyike* 59
- Linuparus* 97
 - trigonus* 97
- Lipkebe* 73

- Lipkius* 61
- Lithodidae 11
- Lucaya* 61
 - bigelowi* 62
- Lysmata* 83
 - trisetacea* 82

- Macrobrachium* 65
 - lar* 66
- Macropetasma* 16
 - africanum* 16
- Mehrippylyte* 78
 - calmani* 78
- Meningodora* 55
 - mollis* 56
- Merguia* 83
 - oligodon* 82
- Mesocaris* 58
- Mesocrangon* 89
 - intermedia* 89
- Metabetaeus* 77
 - minusus* 76
- Metacrangon* 89
 - robusta* 89
- Metapenaeopsis* 10, 12, 13, 16, 32
 - andamanensis* 38
 - akayebi* 36
 - acclivis* 34, 36
 - barbata* 34, 36
 - barbensis* 35
 - beebei* 33
 - borradaili* 37
 - coniger* 39
 - crassissima* 34, 35
 - dalei* 37
 - distincta* 37
 - dura* 34, 35
 - evermanni* 36
 - gerardoii* 32, 33
 - goodei* 33
 - hilarula* 37
 - hobbsi* 32, 33
 - incompta* 38
 - insona* 38
 - kishinouyei* 33
 - kyushensis* 39
 - lamellata* 36
 - lata* 39
 - martinella* 33, 34
 - miersi* 32
 - mineri* 33

- mogiensis* 37
- novaeguineae* 34, 36
- palmensis* 34, 35
- philippi* 38
- provocatoria* 39
- quinquedentata* 37, 38
- rosea* 34, 35
- sibogae* 38
- sinuosa* 34
- smithi* 31, 32
- stridulans* 34, 36
- toloensis* 35
- tarawensis* 37, 38
- velutina* 35, 36
- Metapenaeus* 13, 16, 39
 - affinis* 42
 - bennettiae* 43
 - brevicornis* 40
 - burkenroadi* 43
 - conjunctus* 41
 - dalli* 43
 - demani* 41
 - dobsoni* 40
 - eboracensis* 42
 - elegans* 42
 - endeavouri* 40
 - ensis* 41
 - insolitus* 42
 - intermedius* 39
 - incisipes* 41
 - joyneri* 40
 - lysianassa* 40
 - macleayi* 39
 - mastersii* 41
 - monoceros* 41
 - mutatus* 42
 - necopinans* 42
 - papuensis* 42
 - singaporensis* 42
 - spinulatus* 40
 - stebbingi* 41
 - suluensis* 41
 - tenuipes* 40
- Micratya* 59
 - poeyi* 59
- Microprosthemis* 92, 94
 - plumicorne* 94
 - scabricaudatum* 94
 - semilaeve* 94
 - validum* 92, 94
- Mimocaris* 82
 - heterocarpoides* 82
- Natantia* 9, 15
- Nauticaris* 78
 - marionis* 78
- Nectocrangon* 87
 - crassa* 88
- Nematocariniidae 53
- Nematocarcinus* 53
 - ensifer* 54
- Nematopalaemon* 65
 - tenuipes* 64
- Neolpheopsis* 76
 - hiatti* 75
- Neocrangon* 88
- Neophoberus* 108
 - caecus* 108
- Neopontonides* 71
 - beaufortensis* 72
- Nephropidae 10
- Nephropides* 108, 110
 - birsteini* 110
 - caribbeus* 110
- Nephrops* 8, 108, 110
 - andamanicus* 111
 - arafurensis* 111
 - australiensis* 111
 - binghami* 110
 - boschmai* 111
 - challengeri* 111
 - intermedium* 111
 - japonicus* 111
 - neptunus* 110
 - norvegicus* 110
 - rubellus* 110
 - sagamiensis* 111
 - sibogae* 111
 - sinensis* 111
 - thomsoni* 111
- Nephropsis* 108, 109
 - aculeata* 109
 - agassizi* 109
 - atlantica* 109
 - carpenteri* 109
 - ensirostris* 109
 - malhaensis* 110
 - occidentalis* 109
 - stewarti* 109
 - suhmi* 109
- Nicoides* 86
 - maldivensis* 87
- Notocrangon* 88
 - antarcticus* 88
- Notopandalus* 84

- Notostomus* 55
 —*robustus* 56
- Odontozona* 91, 93
 —*edwardsi* 93
 —*ensifera* 93
 —*sculpticaudata* 93
 —*spongicola* 91, 93
- Ogyrididae 54
Ogyrides 54
Onycocaris 68
 —*quadratophtalma* 69
- Oplophoridae 8, 9, 53, 54
Oplophorus 54
 —*spinus* 55
Oxystomata 9
- Paguridae 4, 10
Paguroopsis 10
Palaeander 65
 —*floridanus* 64
Palaemon 64, 65
 —*longirostris* 63
Palaemonella 66
 —*vestigialis* 67
Palaemonetes 63
 —*antrorum* 65
 —*kadiakensis* 64
Palaemonias 57
 —*ganteri* 57
- Palaemonidae 7, 53, 62
 Palaemoninae 63
 Palinura 9, 10, 95
Palinurellus 96, 98
 —*gundlachi* 98
 —*wieneckii* 98
 Palinuridae 96
Palinurus 97, 98
 —*charlestoni* 98
 —*elephas* 98
 —*gilchristi* 98
 —*mauritanicus* 98
Palinustus 97, 98
 —*mossambicus* 98
 —*truncatus* 98
- Pandalidae 54, 83
Pandalina 84
 —*brevirostris* 85
Pandalopsis 84
 —*ampla* 84
Pandalus 85
 —*montagui* 85
- Pantomus* 5, 83
 —*affinis* 83
Panulirus 97
 —*argus* 99
 —*birgeri* 101
 —*cygnus* 100
 —*dasyptus* 101
 —*echinatus* 101
 —*gracilis* 101
 —*guttatus* 101
 —*homarus* 101
 —*inflatus* 101
 —*interruptus* 99
 —*japonicus* 99, 100
 —*laevicauda* 101
 —*longipes* 100
 —*marginatus* 100
 —*ornatus* 101
 —*pascuensis* 99, 100
 —*penicillatus* 100
 —*polyphagus* 101
 —*rissoni* 101
 —*stimpsoni* 101
Parabetaeus 76
 —*cullierete* 76
Paracrangon 86
 —*areolata* 87
Paralatreutes 82
 —*bicornis* 82
Paranchistus 68
 —*biunguiculatus* 67
Parapandalus 84
 —*richardi* 83
Parapasiphae 60
 —*sulcatifrons* 60
Parapenaopsis 13, 16, 17, 26
 —*acclivirostris* 29
 —*atlantica* 26
 —*balli* 27
 —*cornuta* 27
 —*gracillima* 27
 —*hardwickii* 27
 —*hungerfordi* 27
 —*maxillipedo* 27
 —*nana* 27
 —*sculptilis* 27, 28
 —*stylifera* 27
 —*tenella* 28, 29
 —*uncta* 27
 —*venusta* 29
Parapenaeus 13, 16, 25
 —*americanus* 25

- australiensis* 26
- fissurus* 26
- investigatoris* 26
- lanceolatus* 26
- longipes* 25
- longirostris* 26
- sextuberculatus* 26
- Parastacidae 108
- Paratya* 57
 - compressa* 57
- Paratypton* 73
 - siebenrocki* 73
- Parribacus* 102
 - antarcticus* 102
 - caledonicus* 102
 - holthuisi* 103
 - japonicus* 103
 - perlatus* 102
 - scarlatinus* 102
- Pasiphaea* 12, 60
 - multidentata* 60
- Pasiphaeidae 8, 9, 10, 52, 60
- Penaeidae 7, 9, 12, 14, 15
- Penaeidea 3, 8, 10, 12, 15
- Penaeinae 15
- Penaeus* 13, 14, 16, 17
 - aztecus aztecus* 22
 - aztecus subtilis* 22
 - brasiliensis* 21
 - brevirostris* 23
 - californiensis* 23
 - canaliculatus* 23
 - duorarum duorarum* 21, 22
 - duorarum notialis* 22
 - esculentus* 19, 20
 - indicus* 19
 - kerathurus* 23
 - latisulcatus* 23
 - longystylus* 23
 - marginatus* 23
 - merguiensis* 19, 20
 - monodon* 19, 20
 - occidentalis* 19
 - orientalis* 19
 - paulensis* 23
 - penicillatus* 21
 - plebejus* 24
 - schmitti* 18
 - semisulcatus* 19, 20
 - setiferus* 17, 18
 - stylirostris* 18
 - vannamei* 18
- Penaeopsis* 13, 16, 31
 - megalops* 31
 - rectacuta* 31
 - serrata* 31
- Periclimenes* 67
 - impar* 68
- Periclemeneus* 68
 - tridentatus* 68
- Peripandalus* 84
 - serratus* 84
- Phycocaris* 80
 - simulans* 81
- Philarius* 69
 - imperialis* 69
- Phyllognathia* 74
 - ceratophthalma* 74
- Physetocarididae 54
- Physetocaris* 54
- Platycaris* 70
 - latirostris* 69
- Plesionika* 84
 - martia* 84
- Plesiopenaeus* 48
 - armatus* 48
 - corruscans* 48
 - edwardsianus* 47
- Podophthalmus* 7
- Polycheles* 96
 - typhlops* 95
- Polychelidae 95
- Pomagnathus* 77
 - corralinus* 77
- Pontocaris* 90
 - lacazei* 90
- Pontonia* 70
 - pinnophylax* 69
- Pontonides* 71
 - unciger* 72
- Pontoniinae 63, 66
- Pontoniopsis* 70
 - comanthi* 69
- Pontophilus* 90
 - bidentatus* 90
- Porcellana* 4
- Portunidae 7, 10
- Potamobiidae 10
- Potimirim* 59
 - mexicana* 58
- Prionocrangon* 86
- Procarididae 52
- Procaris* 52
 - ascensionis* 52, 53

- Processa* 86
 —*canaliculata* 87
 Processidae 54, 86
Projasus 97
 —*parkery* 97
Propontonia 71
Protrachypene 17
 —*precipua* 17
 Psalidopodidae 53
Psalidopus 53
Psathyrocaris 61
 —*infirma* 61
Pseudocoutierea 73
 —*elegans* 73
Pseudopalaemon 65
 —*houvieri* 66
Pterocaris 74
 —*typica* 75
Puerulus 97, 98
 —*angulatus* 99
 —*carinatus* 99
 —*sewelli* 99
 —*velutinus* 98

Racilius 77
 —*compressus* 76
 Reptantia 4, 8, 9, 10, 15, 94
 Rhynchocinetidae 53, 61
Rhynchocinetus 5, 61
 —*typus* 61
Rhynocrangon 90
 —*sharpi* 89
Richardina 91, 93
 —*fredericii* 93
 —*spinicincta* 91, 93

Sabinea 86
 —*hystrix* 87
Salmoneus 77
 —*jarli* 76
Saron 78
 —*marmoratus* 78
Sclerocrangon 90
 —*derjugini* 89
 Scyllaridae 6, 8, 96, 101
 Scyllaridea 10, 11, 95, 96
Scyllarides 102
 —*aequinocialis* 103
 —*astori* 103
 —*brasiliensis* 103
 —*deceptor* 103
 —*delfosi* 103
 —*elisabethae* 104
 —*haani* 103
 —*herklotsi* 103
 —*latus* 103
 —*nodifer* 103
 —*roggeveeni* 104
 —*squamosus* 103
 —*tridacnophaga* 104
Scyllarus 101, 104
 —*aesopius* 107
 —*amabilis* 107
 —*americanus* 106
 —*arctus* 104
 —*aureus* 106
 —*batei* 107
 —*bertholdi* 107
 —*bicuspidatus* 107
 —*brevicornis* 106
 —*caparti* 105
 —*chacei* 105
 —*crenatus* 107
 —*cultrifer* 106
 —*delfini* 106
 —*demani* 106
 —*dubius* 108
 —*gibberosus* 107
 —*lewinsohni* 107
 —*martensi* 107
 —*modestus* 107
 —*nearctus* 106
 —*ornatus* 107
 —*paradoxus* 105
 —*planorbis* 105
 —*posteli* 105, 106
 —*pumilus* 107
 —*pygmaeus* 104
 —*rubens* 107
 —*rugosus* 106
 —*sordidus* 108
 —*subarctus* 105
 —*timidus* 107
 —*vitiensis* 107
 Sergestidae 7, 9, 15
 Sergestinae 16
Sicyonia 49
 —*affinis* 52
 —*alliaffinis* 52
 —*brevirostris* 50, 51
 —*burkenroadi* 50
 —*carinata* 50
 —*disedwardsi* 51
 —*disdorsalis* 52

- disparri* 51
- dorsalis* 50
- edwardsii* 50
- foresti* 52
- gal'ata* 52
- ingentis* 52
- laevigata* 49, 51
- parri* 50
- penicillata* 51
- picta* 52
- stimpsoni* 50
- Sicyoninae 15, 49
- Silentia 11
- Solenocera* 7, 13, 43
 - africana* 43
 - agassizii* 44
 - atlantidis* 44
 - florea* 44
 - geijeskesi* 44
 - membranacea* 43, 44
 - mutator* 44
 - necopina* 44
 - vioscai* 44
- Solenocerinae 15, 43
- Spirantocaris* 79
 - lilljehorgi* 79
- Spongicola* 92, 94
 - andamanica* 94
 - henshawi* 94
 - venusta* 92, 94
- Spongicoloides* 92, 94
 - evolutus* 94
 - inermis* 92, 94
 - kochleri* 94
 - profundus* 94
- Stegopontonia* 67
 - commensalis* 67
- Stenopodidae 90
- Stenopodidea 3, 8, 10, 11, 15, 90
- Stenopus* 91, 92
 - hispidus* 91, 92
 - scutellatus* 93
 - spinus* 93
 - tenuirostris* 93
- Stereomastis* 96
 - sculpta* 96
- Stridulentia 11
- Stygiocaris* 58
- Stylodactilidae 8, 53
- Stylodactilus* 53
- Sympasiphaea* 60
 - annectens* 6, 60
- Synalpheus* 77
 - brevicarpus* 77
- Synaxidae 96
- Syncaris* 57
 - pasadene* 58
- Systellaspis* 56
 - debilis* 56
- Tanypenaeus* 17
 - caribeus* 17
- Thalassinidea 8
- Thalassocarididae 54
- Thalassocaris* 54
- Thaumastocaris* 68
 - streptopus* 67
- Thaumastocheles* 111, 108
 - japonicus* 111
 - zaleucus* 111
- Thenus* 102
 - orientalis* 102
- Thor* 80
 - paschalis* 81
- Thoralus* 80
 - cranchi* 81
- Thunor* 77
 - rathbunae* 77
- Tozeuma* 82
 - novaezealandiae* 82
- Trachycaris* 82
 - restricta* 79
- Trachypenaeopsis* 16, 29
 - mobilispinis* 29
 - richtersii* 29
- Troglocaris 57
 - anophthalmus* 57
- Troglocubanus* 65
 - gibarensis* 65
- Tuleariocaris* 67
- Typhlocaridinae 62
- Typhlocaris* 62
 - typhlatya* 58
 - garciai* 58
- Typhlopatsa* 58
- Typton* 4, 73
 - tortugae* 73
- Veleronia* 72
 - serratifrons* 72
- Vercaia* 87
 - gibbosa* 87
- Vir* 66
 - orientalis* 67

Waldola 71

—*schmitti* 72

Willemoesia 95

Xiphocaris 56

—*elongata* 56

Xiphopenaeus 17, 25

—*kroyeri* 25

—*rivetti* 25