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Larval Decapoda (Brachyura)

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Introduction

A proper knowledge of zooplankton, including its larval members, is of fundamental importance since it forms a vital link between primary producers and different consumer levels in the food chain (Wickstead, 1976). Crustacea are among the most prominent animals of the marine zooplankton (Hardy, 1958), to which they often contribute 50% or more of the biomass (Friedrich, 1969a). During their life cycles most decapod crustaceans spend some time as part of this community. With about 10,000 species (Bowman and Abele, 1982), the "ten-footed" Decapoda (Greek *deka*: ten, and *pous*: foot) represent the largest and most varied order of crustaceans, encompassing about one-third of known crustacean species. This order includes the typical larger and well known crustaceans, many of which live on or close to the bottom of the sea as juveniles and adults, but spend their larval life as part of the plankton.

Decapods have two basic adult body plans. Shrimps and lobsters possess well developed tail sections. In contrast, the Brachyura, or short-tailed decapods, have a flat abdomen flexed under the body. This group comprises the true crabs. With about 5,000 species worldwide (Melo, 1996), the true crabs represent half of the Decapoda. Crabs reach their greatest diversity in tropical regions, although a significant number are also found in temperate waters. Thus, within the South Atlantic alone, 328 crab species are presently recognized that belong to 170 genera among 24 families (Table 1). The recent accounts of Boschi *et al.* (1992), Zolessi and Philippi (1995), Martins and D'Incao (1996), and Melo (1996) include most of these species.

Perhaps surprisingly, most of the larvae of these crabs remain unknown. Larval information presented here is available for 102 species, representing less than one third of all known crab species within the South Atlantic. While far from complete, this denotes significant progress over the last 16 years. In comparison, the last coverage of decapod larvae from the area (Boschi, 1981) included only about one quarter of the brachyuran species covered here. Nevertheless, it is clear that we presently still have limited ability in identifying the decapod larvae from the South Atlantic. For example, larvae of several families, including the Cymonomidae, Raninidae, Cyclodorippidae, Geryonidae, Goneplacidae and Palicidae, are unknown within the South Atlantic (Table 1).

Among crustaceans, decapods are considered to be amongst the most advanced groups. Within the lineage of crawling decapods, or Reptantia (Latin *reptare*: to creep), the brachyurans represent the most evolutionary advanced forms, together with their sister group, the Anomala, comprising the hermit crabs and their relatives (Scholtz and Richter, 1995). Our understanding of the evolution of different brachyuran and other decapod groups, however, is still quite poor. Knowledge of ancestor-descendant relationships is largely based on adults. They display a vast array of highly specialized adaptations that may mask their evolutionary relationships. Evidence from larvae may help resolve these problems and early developmental stages are now increasingly used in phylogenetic reconstruction (Rice, 1980; 1983; Clark and Webber, 1991; Marques and Pohle, 1995; Pohle and Marques, 1998).

Even though larval types of most decapods are described below, the brachyuran larval stages found within the plankton are the focus of this chapter. During this phase of their life-cycle, larvae bear very little resemblance to the juvenile and adult form, and the inexperienced observer would be hard pressed to recognize the developmental stages of crabs. In fact, naturalists of an earlier day believed that such larvae represented different animals (Schmitt, 1971).

Before hatching, eggs of true crabs are extruded and brooded by the female in the space between the thorax and cupped abdomen. The number of eggs produced per brood varies widely, from as little as 200 (Telford, 1978), to as many as 8,000,000 (Prager *et al.*, 1990; Mantelatto and Fransozo, 1997). In tropical and subtropical areas, most species spawn and hatch batches of eggs throughout the year (Negreiros-Fransozo and Fransozo, 1995; Negreiros-Fransozo *et al.*, in press; Mantelatto and Fransozo, 1998). In these

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regions incubation periods may be as short as 1-2 weeks (Pohle, 1994), egg size and temperature being determining factors. Larval development is also temperature dependent (Christiansen, 1973), a higher temperature shortening the period, and salinity also affects the duration of the larval phase (Fransozo and Negreiros-Fransozo, 1986; Negreiros-Fransozo and Fransozo, 1990). However, the number of larval stages is another determining factor in the length of the larval period. A warm-water species with 5 larval stages can reach the last larval stage in as little as 9-10 days after hatching (Marques and Pohle, 1996a; Fransozo and Negreiros-Fransozo, 1997).

Brachyurans have two distinct types of larvae, the zoea and megalopa. Zoeae emerge from eggs that usually hatch at night. In some species and under certain conditions, eggs may hatch as a prezoea before molting to a zoea. However, these short-lived prezoeal stages, that are still enclosed within a thin cuticle, are not usually found in the plankton.

Zoeae of various species appear very different from juvenile and adult stages (Fig. 2) but are themselves superficially alike. Thus all zoeae usually have large paired eyes and a full complement of carapace spines, consisting of a dorsal, rostral and lateral spines that give specimens a triangular upright appearance. A notable exception are dromiid and homolid larvae that look more shrimp-like (Fig. 4, 5). An abdomen consisting of a number of somites and ending in a flat fork-shaped telson protrudes from the carapace, as do two pairs of swimming appendages. Other carapace appendages are less apparent. The number of zoeal stages may vary from a single (Goodbody, 1960) to more than ten (Brossi-Garcia and Rodrigues, 1993; Cuesta and Rodrigues, 1994), depending on the species. Only within the family Majidae are there always only two zoeal stages. Older zoeal stages have the same general appearance but can be recognized by movable eyes, paired buds of appendages on the abdomen, rudiments of claws and legs under the carapace and by an increasing number of swimming setae on the locomotory appendages. However, for a considerable number of species only the first zoea is known.

The last zoeal stage undergoes a metamorphosis during the molt to the megalopa. The latter also have been referred to as the megalops (Sastry, 1970), megalop (Clark *et al.*, 1998) decapodid (Felder *et al.*, 1985) or postlarva (Gurney, 1942). This stage has a more flattened, crab-like appearance, with legs and claws protruding from the carapace (Fig. 3). The spines of the carapace have either been lost or are greatly reduced. Unlike adult crabs, however, the abdomen has appendages used for swimming when it is unfolded, with the attachments folded under the carapace while at rest. In comparison to other stages, larval information on the megalopa is the poorest because it is not described in a number of larval publications. This is likely associated with difficulties in rearing, metamorphosis to the megalopa resulting in high mortality. This terminal larval stage is a transitional stage that settles out of the plankton and molts into the first crab instar, the first fully benthic stage. Additional morphological details of larval stages are given in the section dealing with identification.

Brachyuran zoeae are only a few millimeters in size, but are vigorous swimmers. Using both the maxillipeds and abdomen to propel themselves upward and forward in pulses, with the dorsal spine often pointing in the direction of swimming, they swim at speeds of about 1-2 cm s^{-1} (Warner, 1977). When not active, zoeae sink, and thus they must constantly swim upwards to remain in the same place. In contrast, the megalopa swims smoothly forward with the dorsal spine in a vertical position, using abdominal appendages for propulsion. During swimming the legs are tucked close to the body to minimize resistance. Like many larval forms, zoeae react positively to light and a megalopa is initially also attracted to light but this is no longer the case during settlement.

Zoeal stages will feed on a large variety of phyto- and zooplanktonic organisms, appropriate size being more of a determining factor than type of food. However, evidence suggests that animal food is essential to complete larval development (McConaugha, 1985). Zoeal stages use the abdomen in the capture and manipulation of food. The megalopa feeds on other decapod larvae, copepods and young fish, using the claws for prey seizure and holding.

For decapod larvae, as for all marine animals with planktonic larvae, there is high mortality during larval life. Survival to a newly settled crab has been estimated at less than one tenth of a percent (Warner, 1967) for a single brood. This is compensated for by producing vast numbers of larvae. The advantage of producing planktonic larvae is enhanced dispersal, allowing for rapid colonization in distant areas, and the general great abundance of food in the plankton.

Given the present limited knowledge of South Atlantic larvae, it is important for the reader to realize that larvae being identified may not fit any of those described herein. However, in such cases the keys, tables and figures will help in narrowing the search to higher groups, such as families. It also must be recognized that most of the larval accounts are based on laboratory rearings, and it is still unclear how much variability there is between specimens obtained from the wild and those obtained from culture (Ingle, 1992). Thus definitive identifications should be obtained by consultations with experts in the field.

For further reading on decapod larvae and their development, the reviews of Gurney (1942), Rice (1980), Williamson (1982) and Gore (1985) are recommended, as well as other references summarized at the end of this section.

Methods

Field collection

Crustacean larvae, like most other planktonic organisms, are collected in the wild using nets of various mesh sizes that are generally towed behind a vessel or left drifting where there are sufficient currents. Mesh sizes of 500 µm are generally sufficient. A 4-5% formaldehyde (10:1 dilution of commercial formalin) solution is adequate for fixation of specimens. However, for final preservation and handling in the laboratory, transfer to 70% ethanol or 50% isopropanol is recommended.

Laboratory rearing

Undescribed larvae can only be positively identified when raised from known parentage. The first zoeal stage may be obtained by keeping a berried female until hatching occurs. However, other developmental stages can only be acquired by raising larvae in the laboratory. The simple tackle box (Costlow and Bookhout, 1959; 1960a) and finger bowl (Costlow and Bookhout, 1960b) techniques still suffice today. This includes regular changes of sea water and feeding with freshly hatched nauplii of the brine shrimp *Artemia* and the rotiferan *Brachionus*, readily available commercially in the form of dry cysts and resting eggs, respectively. This food source will suffice for larvae of many, but not all species. For those interested in more details of decapod larval culturing techniques, mass culture and single rearing methods have been examined and developed by Provenzano (1967), Rice and Williamson (1970), Sastry (1970), Roberts (1975), Kinne (1977) and Dawirs (1982).

Examination

A good stereo dissecting microscope is essential for proper examination of specimens that are no larger than a few mm in size. Both transmitted and reflected light should be used as a source of illumination, and a microscope equipped with a darkfield/brightfield base helps to highlight structural details.

Identification

For the purposes of this chapter, only the first zoea and the megalopa arc included. However, a key to staging of zoeae is provided. In general, the identifications are largely based on gross morphological features and relative size, and mostly only figures of the whole animal are presented. In some cases, however, this may not be satisfactory for proper identification.

The reader must also bear in mind that for some species not all larval stages are known and that for others, larvae are totally unknown. As well, it should be kept in mind that most descriptions are based on laboratory rearing and that all species exhibit some morphological variability. Thus, descriptions and illustrations may deviate from the specimens being compared. Consequently, when scientific reliability is essential, identifications of specimens should be verified by consulting with experts in the field or by cross-checking with the original description using the appropriate references cited. This may in many cases necessitate the dissection of appendages from the body to help in the identification. A brief protocol follows for anyone wishing to pursue this route.

Dissection will necessitate the use of very fine-tipped needles. While the finest insect pins may be satisfactory for relatively large specimens, best results are obtained by using tungsten wire that is electrolytically sharpened in a 10% KCl solution and fastened onto a probe. For this a microscope transformer can be conveniently used, with one cable attached to an electrode (e.g. a nail) immersed in the solution, the other cable with the tungsten wire at the tip also being dipped into the liquid as low voltage is applied from the transformer. The voltage, emersion time, and depth of wire dipped, are manipulated until the desired shape is obtained.

With the specimen in water on a depression microscope slide, the larval carapace and abdomen should be separated before dealing with the appendages. This is done by using one needle to hold the carapace in place while gently pushing the abdomen away at its point of insertion until it detaches from the carapace. By piercing the carapace with one needle, the other needle can then be used to separate appendages at their point of attachment, starting from the posterior end of the larva. A stain, such as Chlorazol Black, can be added to increase contrast when necessary. For temporary mounts, the dissected parts are pipetted onto a flat microscope slide and a coverslip is applied. A sealant, such as clear fingernail polish, can be applied to the edges to help prevent evaporation. For the preparation of more permanent mounts the reader is referred to Koomen and Von Vaupel Klein (1995). A good compound microscope with 10x, 40x and 100x objectives is required to examine the dissected appendages. A microscope equipped with phase contrast or Nomarski differential interference contrast would be preferable in order to facilitate the determination of critical features such as hair-like setae.

Geographic and bathymetric distribution

Known abiotic factors that strongly affect spatial distribution patterns of planktonic organisms include temperature, salinity, dissolved oxygen, water currents, and depth. The individual or collective action of these and other environmental factors increases or limits the area of distribution for marine species, where those factors with the most significant variations are the ones that limit the area of occurrence (Vernberg and Vernberg, 1970; Melo, 1985).

Presently the study of geographic and bathymetric distributions of larval crustacean stages is still in its infancy and the words of Gardiner (1904) that "... in the present stage of knowledge any consideration of larval distribution is premature and must be inconclusive" still hold true today. The precise zoogeographical distribution of many crab species that occur in the South Atlantic is especially poorly known in eastern waters. Larvae of many Southeastern Atlantic species are unknown and only those that also occur in western areas are covered in this volume. Distributional data presented are mainly based on the occurrence of adults in the Southwest Atlantic, along the coast of Brazil, Uruguay and Argentina. The Brazilian coast is the most diverse with approximately three hundred crab species (Table 1).

Taxonomy

Glossary

Italicized words are defined elsewhere in the glossary. Pl.: plural; abbr.: abbreviation.

Abdomen: the segmented hindmost part of the body usually consisting of 5-6 *somites* and *telson.*
Aesthetasc: specialized chemosensory *seta* with a thin cuticle; found on the *antennule.*
Antenna (pl. antennae; abbr.: an2): the second pair of segmented *cephalic* sensory appendages in Crustacea.
Antennule (abbr.: an1): the first pair of *cephalic* appendages.
Basis (pl. bases): the second segment of an appendage attached to the body.
Biramous: two-branched.
Carapace: exoskeleton covering of *cephalothorax*, often produced into dorsal, rostral and lateral spines.
Cephalic: pertaining to the head.
Cephalothorax: fused head and *thorax* (trunk).
Cheliped: first pair of *pereopods* (ninth pair of appendages), usually stouter than other *pereopods*, the last two segments forming a claw.
Coxa (pl. coxae): the basal segment of an appendage attached to the body.
Dactyl: the terminal or seventh segment of an appendage.
Denticulate: with small teeth.
Endite: a non-specific term to describe a branch of an appendage.
Endopod: the inner branch of a *biramous* appendage.
Epipod: lateral process attached to *protopod.*

Species	Distribution: Geographic	Distribution: Vertical (depth, m)
FAMILY DROMIIDAE		
Cryptodromiopsis antillensis (Stimpson, 1858)	OC: North Carolina, Bermuda, Florida, Gulf of Mexico, The West Indies, northern South America, Guianas and Brazil (Amapá to Rio Grande do Sul)	IT - 330
Dromia erythropus (G. Edwards, 1771)	OC: Bermuda, Florida, Gulf of Mexico, The West Indies, northern South America and Brazil (Pernambuco to São Paulo)	SU - 360
Hypoconcha arcuata Stimpson, 1858	OC: North Carolina to Florida, Gulf of Mexico, The West Indies, Guianas and Brazil (Amapá to São Paulo)	SU - 80
Hypoconcha sabulosa (Linnaeus, 1763) (= *H. parasitica*)	OC: North Carolina to Gulf of Mexico, The West Indies, Venezuela and Brazil (Maranhão to São Paulo)	SU - 90
FAMILY HOMOLIDAE		
Homola barbata (Fabricius, 1793)	OC: Virginia to South of Florida, Gulf of Mexico, The West Indies, Central America, northern South America and Brazil (Rio de Janeiro to Rio Grande do Sul); OR: Portugal and Africa; Mediterranean Sea	30 - 680
Thelxiope barbata (Fabricius, 1793)	OC: USA to Caribbean Sea, Brazil and Uruguay (Maldonado); OR: Azores and Madeira Island, South Africa; Mediterranean Sea	?
FAMILY LATREILLIIDAE		
Latreillia elegans Roux, 1828	OC: North Atlantic, Brazil (Rio Grande do Sul) and Uruguay; OR: Mediterranean Sea; Adriatic Sea	?
Latreillia williamsi Melo, 1990	OC: Brazil (Rio de Janeiro to Rio Grande do Sul)	130 - 290; occasionally in shallower water
FAMILY DORIPPIDAE		
Ethusa americana A. Milne Edwards, 1880	OC: North Carolina, Florida, Gulf of Mexico, The West Indies and Brazil (Maranhão to Rio de Janeiro); OP: Gulf of California and Panama	SU - 90
Ethusa microphthalma Smith, 1881	OC: Massachussets to North Carolina, Florida, Gulf of Mexico, The West Indies and Brazil (São Paulo)	110 - 750
Ethusa tenuipes Rathbun, 1897	OC: North Carolina, Florida, Gulf of Mexico, northern South America and Brazil (Rio de Janeiro and São Paulo)	40 - 400
Ethusina abyssicola Smith, 1884	OC: Massachussets to North Carolina, Gulf of Mexico and Brazil (Rio de Janeiro); OR: Mediterranean Sea: Spain	850 - 4050
FAMILY CALAPPIDAE		
Acanthocarpus alexandri Stimpson, 1871	OC: Massachussets, North Carolina to Florida, Gulf of Mexico and Brazil (Rio de Janeiro to Rio Grande do Sul)	70 - 480
Calappa angusta A. Milne Edwards, 1880	OC: North Carolina, Florida, Gulf of Mexico, The West Indies, Venezuela and Brazil (Paraíba to Rio Grande do Sul)	SU - 280
Calappa gallus (Herbst, 1803)	OC: Bermuda, Florida, Gulf of Mexico, The West Indies, Central America, northern South America and Brazil (Ceará to Rio Grande do Sul); CA: Santa Helena Island; OR: Cape Verde Island to Angola; Red Sea, Persian Gulf; IP: Japan	IT - 220

Species	Distribution: Geographic	Distribution: Vertical (depth, m)
Calappa nitida Holthuis, 1958	OC: The West Indies, Venezuela, Suriname, Guiana and Brazil (Amapá and Pará)	SU - 70
Calappa ocellata Holthuis, 1958	OC: North Carolina, Florida, Gulf of Mexico, The West Indies, Colombia, Venezuela and Brazil (Amapá to Rio de Janeiro)	SU - 80
Calappa sulcata Rathbun, 1898	OC: North Carolina, Florida, Gulf of Mexico, The West Indies, Colombia, Venezuela, Guianas and Brazil (Amapá to Espírito Santo and Paraná)	SU - 200
Cyclöes bairdii Stimpson, 1860	OC: North Carolina, Bermuda, Florida, Gulf of Mexico, The West Indies, Colombia, Venezuela and Brazil (Amapá to Rio de Janeiro); OP: California and Central America	infralittoral - 230
Hepatus gronovii Holthuis, 1959	OC: Colombia, Venezuela, Guianas and Brazil (Amapá to Santa Catarina)	20 - 60
Hepatus pudibundus (Herbst, 1785)	OC: Georgia, Gulf of Mexico, The West Indies, Venezuela, Guianas, Brazil (Amapá to Rio Grande do Sul), Uruguay; OR: Guinea to South Africa	SU - 160
Hepatus scaber Holthuis, 1959	OC:Venezuela, Guianas and Brazil (Amapá to Rio de Janeiro)	20 - 85
Osachila antillensis Rathbun, 1916	OC: Bermuda, Gulf of Mexico, The West Indies and Brazil (Amapá to Rio Grande do Sul)	80 - 300
Osachila tuberosa Stimpson, 1871	OC: North Carolina, Florida, Gulf of Mexico, The West Indies, Venezuela and Brazil (Rio de Janeiro to Rio Grande do Sul)	40 - 190
FAMILY LEUCOSIIDAE		
Callidactylus asper Stimpson, 1871	OC: North Carolina, Florida, Gulf of Mexico, Bermuda, The West Indies, Colombia and Brazil (Amapá to Sergipe)	25 - 90
Ebalia stimpsoni A. Milne Edwards, 1880	OC: North Carolina, Florida, Gulf of Mexico, The West Indies, Colombia and Brazil (Amapá to São Paulo)	SU - 160
Iliacantha intermedia Miers, 1886	OC: North and South Carolina, Florida, Gulf of Mexico, The West Indies, Colombia, Venezuela, Guianas and Brazil (Maranhão to Rio de Janeiro)	SU - 130
Iliacantha liodactylus Rathbun, 1898	OC: Florida, Gulf of Mexico, The West Indies, Colombia, Venezuela, Guianas and Brazil (Amapá to Bahia)	SU - 130
Iliacantha sparsa Stimpson, 1871	OC: Florida, Gulf of Mexico, The West Indies, Colombia and Brazil (Pará to Espírito Santo)	20 - 80
Iliacantha subglobosa Stimpson, 1871	OC: North Carolina to Florida, Gulf of Mexico, The West Indies and Brazil (Amapá to Alagoas)	SU - 400
* *Leucosia planata* (Fabricius, 1793)	OC: Argentina	?
Lithadia brasiliensis (von Martens, 1872)	OC: Brazil (Pará to São Paulo)	SU - 40
Lithadia conica (Coelho, 1973)	OC: Brazil (Amapá to Espírito Santo)	40 - 85
Lithadia obliqua (Coelho, 1973)	OC: Brazil (Pará to Pernambuco)	SU - 30
Lithadia rotundata (A. Milne Edwards, 1880)	OC: Brazil (Rio Grande do Sul), Argentina (San Matias Gulf)	20 - 80
Lithadia vertiginosa (Coelho, 1973)	OC: Brazil (Pará to Bahia)	30 - 60

Species	Distribution	
	Geographic	**Vertical** (depth, m)
Myropsis quinquespinosa Stimpson, 1871	OC: Massachussets, North Carolina, Florida, Gulf of Mexico, The West Indies, Colombia, Venezuela, Guianas and Brazil (Rio de Janeiro to Rio Grande do Sul), Uruguay and Argentina	90 - 330
Persephona crinita Rathbun, 1931	OC: Gulf of Mexico, The West Indies, Venezuela, and Brazil (Amapá to Santa Catarina)	5 - 90
Persephona lichtensteinii Leach, 1817	OC: Venezuela, Suriname, Guianas and Brazil (Amapá to São Paulo)	IT - 70
Persephona mediterranea (Herbst, 1794)	OC: New Jersey, North and South Carolina, Florida, Gulf of Mexico, The West Indies, Venezuela, Suriname, Guianas and Brazil (Amapá to Rio Grande do Sul) and Uruguay	IT - 60
Persephona punctata (Linnaeus, 1758)	OC: The West Indies, Colombia, Venezuela, Guianas and Brazil (Amapá to Rio Grande do Sul)	IT - 50
Randallia laevis (Borradaile, 1916)	OC: Brazil (Ilha Trindade)	?
Speloeophorus elevatus Rathbun, 1898	OC: Florida, Gulf of Mexico, The West Indies and Brazil (Maranhão to Bahia)	SU - 85
Speloeophorus nodosus (Bell, 1855)	OC: North and South Carolina, Florida, Gulf of Mexico, The West Indies and Brazil (Maranhão to Rio de Janeiro)	10 - 30
FAMILY CYCLODORIPPIDAE		
Clythrocerus carinatus Coelho, 1973	OC: Brazil (Pará to São Paulo)	20 - 60
Clythrocerus granulatus (Rathbun, 1898)	OC: Florida, The West Indies, Venezuela and Brazil (Amapá to Rio Grande do Sul)	80 - 600
Clythrocerus moreirai Tavares, 1993	OC: Brazil (São Paulo)	65 - 220
Cyclodorippe angulata Tavares, 1991	OC: Brazil (Espírito Santo and Rio de Janeiro)	130- 350
Cyclodorippe antennaria A. Milne Edwards, 1880	OC: Gulf of Mexico, The West Indies and Brazil (Rio de Janeiro)	40 - 650
Deilocerus analogus (Coelho, 1973)	OC: Brazil (Maranhão to São Paulo)	60 - 110
Deilocerus perpusillus (Rathbun, 1901)	OC: North Carolina, The West Indies and Brazil (Amapá to Rio Grande do Sul)	30 - 180
Neocorycodus stimpsoni (Rathbun, 1937)	OC: Florida, Gulf of Mexico, The West Indies and Brazil (Amapá to São Paulo)	40 - 180
FAMILY CYMONOMIDAE		
Cymonomoides guinotae (Tavares, 1991)	OC: Brazil (Espírito Santo and Rio de Janeiro)	500 - 900
Cymonomus guillei Tavares, 1991	OC: Brazil (Espírito Santo and Rio de Janeiro)	590 - 730
Cymonomus magnirostris Tavares, 1991	OC: Brazil (Espírito Santo and Rio de Janeiro)	590 - 730
Cymonomus quadratus A. Milne Edwards, 1880	OC: Florida, Gulf of Mexico, The West Indies and Brazil (Amapá and Rio de Janeiro to Rio Grande do Sul)	190 - 930
FAMILY RANINIDAE		
Ranilia constricta (A. Milne Edwards, 1880)	OC: Florida, Gulf of Mexico, The West Indies, and Brazil (Amapá to Rio Grande do Sul); CA: Ascenção Island; OR: Senegal to Congo	20 - 340
Ranilia guinotae Melo and Campos Jr., 1994	OC: Brazil (São Paulo)	?
Ranilia muricata H. Milne Edwards, 1837	OC: North Carolina to Gulf of Mexico, Colombia and Brazil (Pernambuco)	10 - 100
Raninoides laevis (Latreille, 1825)	OC: North Carolina, Florida, Gulf of Mexico, The West Indies, Venezuela and Brazil (Amapá to São Paulo)	SU - 200

Species	Distribution	
	Geographic	Vertical (depth, m)
Symethis variolosa (Fabricius, 1793)	OC: North Carolina, Florida, Gulf of Mexico, The West Indies and Brazil (Fernando de Noronha and Amapá to São Paulo)	20 - 110
FAMILY MAJIDAE		
Acanthonyx dissimulatus Coelho, 1991-1993	OC: Brazil (Piauí to Bahia)	IT - 25
Acanthonyx scutiformis (Dana, 1851)	OC: Brazil (Espírito Santo to São Paulo)	IT
Aepinus septemspinosus (A. Milne Edwards, 1879)	OC: Florida, Gulf of Mexico, The West Indies and Brazil (Fernando de Noronha, Rocas and Pará to São Paulo)	10 - 85
Anasimus fugax A. Milne Edwards, 1880	OC: The West Indies (Porto Rico) and Brazil (Amapá to Rio de Janeiro)	60 - 200
Anasimus latus Rathbun, 1894	OC: North Carolina to Florida, Gulf of Mexico, The West Indies and Brazil (Amapá)	SU - 160
Anomalothir furcillatus (Stimpson, 1871)	OC: North Carolina, Florida, Gulf of Mexico, The West Indies and Brazil (Rio Grande do Sul)	50 - 180
Apiomithrax violaceus (A. Milne Edwards, 1868)	OC: Brazil (Paráíba to Rio Grande do Sul); OR: Cape Verde Island, Cape Branco to Angola; CA: Ascension Island	10 - 50
Arachnopsis filipes Stimpson, 1871	OC: North Carolina to Florida, Gulf of Mexico, The West Indies and Brazil (Amapá and Rio Grande do Norte)	30 - 240
Batrachonotus brasiliensis Rathbun, 1894	OC: Brazil (Pará to São Paulo)	12 - 73
Chorinus heros (Herbst, 1790)	OC: Bermuda, Florida, Gulf of Mexico, The West Indies, Venezuela and Brazil (Ceará to Bahia)	10 - 50
Collodes armatus Rathbun, 1898	OC: Gulf of Mexico, Cuba and Brazil (Espírito Santo and Rio de Janeiro)	20 - 70
Collodes inermis A. Milne Edwards, 1878	OC: Gulf of Mexico and The West Indies to Brazil (Amapá to Rio de Janeiro)	SU - 40
Collodes rostratus A. Milne Edwards, 1878	OC: Brazil (Espírito Santo to Rio Grande do Sul), Argentina (including Patagonia)	20 - 65
Collodes trispinosus Stimpson, 1871	OC: North Carolina to Florida, Gulf of Mexico and Brazil (Amapá, Rio de Janeiro and São Paulo)	10 - 250
Epialtoides rostratus Coelho, 1972	OC: Brazil (Maranhão to Espírito Santo)	20 - 60
Epialtus bituberculatus H. Milne Edwards, 1834	OC: Florida, Gulf of Mexico, The West Indies, Colombia, Venezuela and Brazil (Ceará to São Paulo)	IT
Epialtus brasiliensis Dana, 1852	OC: Colombia and Brazil (Espírito Santo to São Paulo)	IT
Euprognatha acuta A. Milne Edwards, 1880	OC: Massachussets to Florida, Gulf of Mexico, The West Indies, Guianas and Brazil (Amapá to Rio Grande do Sul) and Uruguay	15 - 710
Euprognatha gracilipes A. Milne Edwards, 1878	OC: Florida, Gulf of Mexico, The West Indies and Brazil (Amapá and Ceará to Rio de Janeiro, São Paulo and Santa Catarina)	70 - 370
Eurypodius latreillei Guérin, 1828	OC: Brazil (Rio de Janeiro to Rio Grande do Sul), Argentina (including Patagonia), Malvina Island, Strait of Magellan, Uruguay; OP: Peru and Chile	SU - 100
Hemus cristulipes A. Milne Edwards, 1875	OC: North and South Carolina, Florida, Gulf of Mexico, The West Indies and Brazil (Fernando de Noronha, Maranhão to Rio de Janeiro)	15 - 70
Herbstia depressa Stimpson, 1860	OC: The West Indies, Venezuela and Brazil (Alagoas)	60 - 700
Holoplites armata (A. Milne Edwards, 1880)	OC: Gulf of Mexico, The West Indies and Brazil (Pará)	160 - 800

Species	Distribution	
	Geographic	Vertical (depth, m)
Inachoides forceps A. Milne Edwards, 1879	OC: North Carolina to Florida, Gulf of Mexico, The West Indies, Guianas and Brazil (Amapá to Rio de Janeiro)	15 - 70
Leptopisa setirostris (Stimpson, 1871)	OC: Florida, The West Indies, Venezuela and Brazil (Maranhão to Espírito Santo)	IT - 80
Leucippa pentagona H. Milne Edwards, 1833	OC: Brazil (Rio de Janeiro and São Paulo), Uruguay and Argentina; OP: California, Mexico and Chile	20 - 80
* *Leurocyclus gracilipes* (A. Milne Edwards and Bouvier, 1923)	OC: Uruguay (Flores Island) and Argentina	?
Leurocyclus tuberculosus (H. Milne Edwards and Lucas, 1843)	OC: Brazil (Rio de Janeiro to Rio Grande do Sul), Uruguay and Argentina (including Patagonia); OP: Chile	10 - 170
Libidoclaea granaria H. Milne Edwards and Lucas, 1843	OC: Brazil (Rio Grande do Sul), Argentina (including Patagonia) and Uruguay; OP: Chile (Strait of Magellan)	deep
Libinia bellicosa Oliveira, 1944	OC: Panama, Guianas and Brazil (Ceará, Rio de Janeiro and Paraná)	10 - 30
Libinia ferreirae Brito Capello, 1871	OC: Guianas, Venezuela, Brazil (Pará to Santa Catarina) and Uruguay	IT - 35
Libinia spinosa H. Milne Edwards, 1834	OC: Brazil (Espírito Santo to Rio Grande do Sul); OR: Senegal to Angola, Cape Verde Island; OP: South of California to North of Chile, Galapagos Islands and Hawaii	10 - 130
Macrocoeloma camptocerum (Stimpson, 1871)	OC: North Carolina, Florida, Gulf of Mexico and Brazil (Amapá to Maranhão)	10 - 103
Macrocoeloma concavum Miers, 1886	OC: The West Indies and Brazil (Fernando de Noronha, Maranhão to Bahia)	10 - 40
Macrocoeloma eutheca (Stimpson, 1871)	OC: North Carolina to Florida, Gulf of Mexico, The West Indies, Central America and Brazil (Maranhão to Espírito Santo)	30 - 215
Macrocoeloma laevigatum (Stimpson, 1860)	OC: Florida, Gulf of Mexico, The West Indies and Brazil (Pará to Alagoas)	IT - 30
Macrocoeloma septemspinosum (Stimpson, 1871)	OC: South Carolina, Florida, Gulf of Mexico and Brazil (Ceará to Bahia)	10 - 210
Macrocoeloma subparallelum (Stimpson, 1860)	OC: Gulf of Mexico, The West Indies, Venezuela and Brazil (Fernando de Noronha, Amapá to Espírito Santo)	IT - 25
Macrocoeloma trispinosum (Latreille, 1825)	OC: North Carolina, Bermuda, Florida, Gulf of Mexico, The West Indies and Brazil (Fernando de Noronha, Piauí to São Paulo)	10 - 80
Metoporhaphis calcarata (Say, 1818)	OC: North Carolina, Florida, Gulf of Mexico and Brazil (Espírito Santo and Rio de Janeiro)	SU - 90
Microlissa brasiliensis (Rathbun, 1923)	OC: Brazil (Ceará to São Paulo)	10 - 85
Microphrys antillensis Rathbun,1920	OC: North Carolina, Florida, Gulf of Mexico, The West Indies and Brazil (Paráiba to Rio de Janeiro)	10 - 40
Microphrys bicornutus (Latreille, 1825)	OC: North Carolina to South of Florida, Bermuda, Gulf of Mexico, The West Indies, Central America, Venezuela and Brazil (Maranhão to Rio Grande do Sul; Fernando de Noronha)	IT - 70
Microphrys garthi (Lemos de Castro, 1953)	OC: Brazil (Paraíba to Rio de Janeiro)	IT - 10
Microphrys interruptus Rathbun, 1920	OC: The West Indies and Brazil (Piauí to Alagoas, Fernando de Noronha)	10 - 50

Species	Distribution	
	Geographic	Vertical (depth, m)
Mithraculus coryphe (Herbst, 1801)	OC: Florida, Gulf of Mexico, The West Indies, northern South America and Brazil (Ceará to São Paulo; Fernando de Noronha)	IT - 60
Mithraculus forceps (A. Milne Edwards, 1875)	OC: North Carolina to South of Florida, Gulf of Mexico, The West Indies, Venezuela and Brazil (Maranhão to São Paulo; Rocas and Fernando de Noronha)	IT - 90
Mithraculus sculptus (Lamarck, 1818)	OC: Florida, Gulf of Mexico, The West Indies and Brazil (Rio Grande do Norte to Bahia)	10 - 60
Mithrax besnardi Melo, 1990	OC: Brazil (Rio Grande do Sul) and Uruguay	230 - 2100
Mithrax braziliensis Rathbun, 1892	OC: Brazil (Piauí to Rio de Janeiro)	IT - 8
Mithrax caribbaeus Rathbun, 1920	OC: The West Indies, Venezuela and Brazil (Bahia to Rio de Janeiro)	IT - 25
Mithrax hemphilli Rathbun, 1892	OC: Florida, The West Indies and Brazil (Rocas and Maranhão to Rio de Janeiro)	IT - 60
Mithrax hispidus (Herbst, 1790)	OC: Delaware to South of Florida, Gulf of Mexico, The West Indies and Brazil (Pará to São Paulo)	IT - 65
Mithrax tortugae Rathbun, 1920	OC: Florida, The West Indies, Colombia, Venezuela and Brazil (Espírito Santo to São Paulo)	IT - 10
Mithrax verrucosus H. Milne Edwards, 1832	OC: South Carolina, Florida, Gulf of Mexico, The West Indies and Brazil (Fernando de Noronha and Rocas)	IT - 10
Mocosoa crebripunctata Stimpson, 1871	OC: Florida, Gulf of Mexico and Brazil (Maranhão to Rio de Janeiro)	20 - 130
Nemausa acuticornis (Stimpson, 1871)	OC: North Carolina to Florida, Gulf of Mexico, The West Indies and Brazil (Amapá to Rio de Janeiro)	10 - 100
Nemausa cornutus (Saussure, 1857)	OC: Bermuda, Florida, Gulf of Mexico, The West Indies and Brazil (Amapá to Bahia)	10 - 1070
Nibilia antilocapra (Stimpson, 1871)	OC: North Carolina to Florida, Gulf of Mexico, The West Indies and Brazil (Rio Grande do Norte to Rio Grande do Sul)	70 - 260
Notolopas brasiliensis Miers, 1886	OC: Colombia, Venezuela and Brazil (Amapá to São Paulo)	IT - 30
Paradasygius tuberculatus (Lemos de Castro, 1949)	OC: Brazil (Amapá to Ceará)	10 - 40
Pelia rotunda A. Milne Edwards, 1875	OC: Brazil (Pará to Rio Grande do Sul), Uruguay and Argentina	IT - 190
Picroceroides tubularis Miers, 1886	OC: Florida, Gulf of Mexico, Cuba, Jamaica, Haiti, Saint Thomas, Virgin Islands and Brazil (Maranhão to Espírito Santo)	20 - 90
Pitho lherminieri (Schramm, 1867)	OC: North Carolina to Florida, Gulf of Mexico, The West Indies and Brazil (Pará to São Paulo and Fernando de Noronha)	10 - 200
Podochela algicola (Stebbing, 1914)	OC: Colombia and Brazil (Maranhão to São Paulo)	24 - 90
Podochela brasiliensis Coelho, 1972	OC: Brazil (Ceará to Sergipe)	20 - 50
Podochela gracilipes Stimpson, 1871	OC: North and South Carolina, Florida, Gulf of Mexico, The West Indies, Colombia, Guianas and Brazil (Amapá to Rio Grande do Sul)	IT - 220
Podochela minuscula Coelho, 1972	OC: Brazil (Ceará to Pernambuco)	20 - 60

Species	Distribution	
	Geographic	Vertical (depth, m)
Podochela riisei Stimpson, 1860	OC: North Carolina to Gulf of Mexico, The West Indies and Brazil (Paraíba, Pernambuco and Rio de Janeiro)	SU - 140
Pyromaia tuberculata (Lockington, 1876)	OC: Brazil (Rio de Janeiro to Paraná); OP: California, Central America to Chile; IP: Japan	10 - 130
Rochinia confusa Tavares, 1991	OC: Brazil (Espírito Santo)	590 - 730
Rochinia gracilipes A. Milne Edwards, 1875	OC: Brazil (Rio de Janeiro to Rio Grande do Sul), Uruguay, Argentina and Antarctica	15 - 175
Stenocionops furcata (Olivier, 1791)	OC: Georgia, Florida, Gulf of Mexico, The West Indies, Colombia and Brazil (Ceará to Rio Grande do Sul)	IT - 180
Stenocionops spinimana (Rathbun, 1892)	OC: North Carolina to Florida, Gulf of Mexico and Brazil (São Paulo)	35 - 225
Stenocionops spinosissima (Saussure, 1857)	OC: North Carolina to Florida, Gulf of Mexico, The West Indies, Brazil (Fernando de Noronha, Rio Grande do Norte to Rio Grande do Sul) and Uruguay	50 - 480
Stenorhynchus seticornis (Herbst, 1788)	OC: North Carolina, Florida, Gulf of Mexico, The West Indies, Colombia, Venezuela (Isla Margarita), Guianas, Brazil (Amapá to Rio Grande do Sul), Uruguay and Argentina	IT - 100
Taliepus dentatus (H. Milne Edwards, 1834)	OC: Brazil (Rio de Janeiro); OP: Peru and Chile	SU - 60
Taliepus marginatus (Bell, 1835)	OC: Brazil and Uruguay; OP: Peru, Chile and Ecuador (Galapagos Islands)	?
Teleophrys ornatus Rathbun, 1901	OC: Gulf of Mexico, The West Indies and Brazil (Fernando de Noronha)	10 - 45
Teleophrys pococki Rathbun, 1924	OC: Curaçao and Brazil (Fernando de Noronha, Pernambuco and Alagoas)	IT - 10
Thoe aspera Rathbun, 1901	OC: Puerto Rico and Brazil (Pernambuco and Alagoas)	IT - 10
Tiche emarginata White, 1847	OC: North Carolina, Florida, Gulf of Mexico, The West Indies and Brazil (Rio Grande do Norte)	10 - 40
Tiche potiguara Garth, 1952	OC: Brazil (Rio Grande do Norte to Alagoas)	25 - 70
FAMILY PARTHENOPIDAE		
Cryptopodia concava Stimpson, 1871	OC: North Carolina, Florida, Gulf of Mexico, The West Indies and Brazil (Maranhão to Rio de Janeiro)	10 - 60
Heterocrypta granulata (Gibbes, 1850)	OC: Massachussets to Florida, Gulf of Mexico, The West Indies and Brazil (Ceará to Paraná)	10 - 140
Heterocrypta lapidea Rathbun, 1901	OC: The West Indies and Brazil (Pará to Rio Grande do Sul)	IT - 180
Heterocrypta tommasii Rodrigues da Costa, 1959	OC: Central America, Guianas and Brazil (Ceará to Rio Grande do Sul)	IT - 15
**Lambrus meridionalis* Boschi, 1965	OC: USA (Pennsylvania) and Uruguay; Mediterranean and Adriatic Sea; OR: Azores and Cape Verde Islands	?
Leiolambrus nitidus Rathbun, 1901	OC: Gulf of Mexico, The West Indies, Guianas and Brazil (Pará to Espírito Santo)	7 - 75
Mesorhoea sexspinosa Stimpson, 1871	OC: North Carolina, Florida, Gulf of Mexico, The West Indies and Brazil (Pará to Rio Grande do Sul)	IT - 100
Parthenope (Parthenope) agona (Stimpson, 1871)	OC: North Carolina, Florida, Gulf of Mexico, The West Indies, Guianas and Brazil (Amapá to Rio Grande do Sul)	IT - 100
Parthenope (Platylambrus) aylthoni (Righi, 1965)	OC: Brazil (Rio de Janeiro and São Paulo), Uruguay and Argentina	15 - 115

Species	Distribution: Geographic	Distribution: Vertical (depth, m)
Parthenope (Platylambrus) fraterculus (Stimpson, 1871)	OC: North Carolina to Florida, Gulf of Mexico, The West Indies, Suriname and Brazil (Amapá to Rio Grande do Sul)	10 - 200
Parthenope (Platylambrus) guerini (Brito Capello, 1871)	OC: The West Indies and Brazil (Rio Grande do Norte to São Paulo)	15 - 30
Parthenope (Platylambrus) pourtalesii (Stimpson, 1871)	OC: New Jersey to South Florida, Gulf of Mexico, The West Indies and Brazil (Amapá to Rio Grande do Sul)	20 - 350
Parthenope (Platylambrus) serrata (H. Milne Edwards, 1834)	OC: North Carolina, Florida, Bermuda, Gulf of Mexico, The West Indies, Guianas, northern South America and Brazil (Maranhão to São Paulo)	10 - 110
Solenolambrus brasiliensis Rodrigues da Costa, 1961	OC: Brazil (Rio de Janeiro to Santa Catarina)	10 - 100
Solenolambrus typicus Stimpson, 1871	OC: North Carolina, Florida, Gulf of Mexico, The West Indies and Brazil (Rio de Janeiro)	90 - 620
Thyrolambrus astroides Rathbun, 1894	OC: Gulf of Mexico, The West Indies and Brazil (Pará to Rio de Janeiro); IP: Mauritius and Andaman Sea; OP: Revillagigedo Islands	50 - 370
FAMILY HYMENOSOMATIDAE		
* *Halicarcinus planatus* (Fabricius, 1775)	OC: Argentina (Mar del Plata), Strait of Magellan; OP: Chile; IP: New Zealand	10 - 170
FAMILY ATELECYCLIDAE		
Peltarion spinulosum (White, 1843)	OC: Brazil (Rio Grande do Sul), Argentina (including Patagonia) and Uruguay (Maldonado); OP: Chile (Punta Arenas)	10 - 300
FAMILY BELLIIDAE		
* *Acanthocyclus albatrossis* Rathbun, 1898	OC: Argentina (Malvinas Island); OP: Chile (Talcahuano and Strait of Magellan)	SU
* *Acanthocyclus gayi* Milne Edwards and Lucas, 1844	OC: Argentina; OP: Chile	SU
Bellia picta H. Milne Edwards, 1848	OC: Brazil (Rio Grande do Sul); OP: Peru and Chile	?
Corystoides chilensis Lucas, 1844	OC: Brazil (Rio de Janeiro to Rio Grande do Sul), Argentina (Patagonia) and Uruguay; OP: Chile	5 - 30
FAMILY PORTUNIDAE		
Arenaeus cribrarius (Lamarck, 1818)	OC: Massachussets to North Carolina, Bermuda, Florida, Gulf of Mexico, The West Indies, Colombia, Venezuela, Brazil (Ceará to Rio Grande do Sul) and Uruguay (Maldonado)	IT - 70
Callinectes acutidens Rathbun, 1895	OC: Florida, Porto Rico, Panama, Brazil, Uruguay and Argentina (Buenos Aires and Prata River)	?
Callinectes bocourti A. Milne Edwards, 1879	OC: Florida, Gulf of Mexico, The West Indies, Colombia, Venezuela, Guianas and Brazil (Amapá to Santa Catarina)	IT - 20
Callinectes danae Smith, 1869	OC: Bermuda, Florida, Gulf of Mexico, The West Indies, Colombia, Venezuela and Brazil (Paraíba to Rio Grande do Sul)	IT - 75
Callinectes exasperatus (Gerstaecker, 1856)	OC: Bermuda, Florida, Gulf of Mexico, The West Indies, Venezuela and Brazil (Maranhão to Santa Catarina)	IT - 8

Species	Distribution: Geographic	Distribution: Vertical (depth, m)
Callinectes larvatus Ordway, 1863	OC: North Carolina to Florida, Gulf of Mexico, Bermuda, The West Indies, Colombia, Venezuela and Brazil (Ceará to São Paulo)	IT - 25
Callinectes ornatus Ordway, 1863	OC: North Carolina to Florida, Gulf of Mexico, The West Indies, Colombia, Venezuela, Guianas and Brazil (Amapá to Rio Grande do Sul)	4 - 75
Callinectes sapidus Rathbun, 1896	OC: Southern USA to Gulf of Mexico, The West Indies, Central America, Venezuela, Brazil (Bahia to Rio Grande do Sul), Argentina and Uruguay; OR: North Sea, Mediterranean, Adriatic Sea, Black Sea; IP: Japan	IT - 90
Charybdis hellerii (A. Milne Edwards, 1867)	OC: eastern Florida, Cuba, Colombia, Venezuela and Brazil (Alagoas, São Paulo, Santa Catarina); OR: Eastern Mediterranean: Israel and Egypt; IP: Japan, Philipinnes, New Caledonia, Australia, Hawaii, and throughout the Indian Ocean, including the Red Sea	IT - 51
Coenophthalmus tridentatus A. Milne Edwards, 1879	OC: Brazil (Rio de Janeiro to Rio Grande do Sul), Uruguay and Argentina (including Patagonia)	15 - 50
Cronius ruber (Lamarck, 1818)	OC: North Carolina to South Florida, Gulf of Mexico, The West Indies, Central America, northern South America, Guianas and Brazil (Amapá to Rio Grande do Sul); OR: Senegal to Angola; OP: California to Peru and Galapagos Islands	IT - 110
Cronius tumidulus (Stimpson, 1871)	OC: Bermuda, Florida, Gulf of Mexico, The West Indies, Guianas and Brazil (Pará to São Paulo)	10- 75
Laleonectes vocans (A. Milne Edwards, 1878)	OC: Gulf of Mexico, The West Indies and Brazil (Espírito Santo and Rio de Janeiro); CA: Ascension Island; OR: Madeira, Cape Verde and Annobon Islands	40 - 310
* *Ovalipes catharus* (White, 1843)	OC: Uruguay (La Paloma, Cape Santa Maria) and Argentina (Puerto Madryn); OR: South Africa; OP: Peru, Chile; IP: Japan, China, Australia and New Zealand	?
Ovalipes punctatus (De Haan, 1833)	OC: Brazil (Rio Grande do Sul), Uruguay (Rocha and Cape de Santa Maria) and Argentina (Chubut); OR: South Africa; OP: Peru and Chile; IP: Japan, China, Australia and New Zealand	?
Ovalipes trimaculatus (De Haan, 1833)	OC: Southern USA, Central America, Brazil (São Paulo to Rio Grande do Sul), Uruguay and Argentina (including Patagonia); OR: South Africa; South IP, including Australia and New Zealand, and OP: Peru and Chile	?
Portunus anceps (Saussure, 1858)	OC: North Carolina, Bermuda, Florida, Gulf of Mexico, The West Indies and Brazil (Amapá to Rio de Janeiro)	?
Portunus gibbesii (Stimpson, 1859)	OC: Massachussets to Florida, Gulf of Mexico, Venezuela, Guianas and Brazil (Bahia)	IT - 90
Portunus ordwayi (Stimpson, 1860)	OC: Massachussets to Florida, Gulf of Mexico, The West Indies, Venezuela, Guianas and Brazil (Amapá to Rio Grande do Sul, Fernando de Noronha)	IT - 110
Portunus rufiremus Holthuis, 1959	OC: Guianas and Brazil (Amapá to Pará)	20 - 45

Species	Distribution	
	Geographic	Vertical (depth, m)
Portunus spinicarpus (Stimpson, 1871)	OC: North and South Carolina, Florida, Gulf of Mexico, The West Indies, Colombia, Venezuela, Guianas, Brazil (Amapá to Rio Grande do Sul) and Uruguay (Maldonado)	IT - 550
Portunus spinimanus Latreille, 1819	OC: New Jersey to South Florida, Bermuda, Gulf of Mexico, The West Indies, Venezuela, Guianas and Brazil (Pernambuco to Rio Grande do Sul)	IT - 90
Portunus ventralis (A. Milne Edwards, 1879)	OC: Georgia, Florida, Gulf of Mexico, The West Indies, Venezuela and Brazil (Rio Grande do Norte to Rio de Janeiro)	IT - 25
Scylla serrata (Forskal, 1775)	OC: Brazil (São Paulo); OP: Mozambique and South Africa; IP: Philipinnes and Japan	IT - 15
FAMILY GERYONIDAE		
Chaceon notialis Manning and Holthuis, 1989	OC: Brazil (Cape Frio), Uruguay and Argentina; OP: Chile; OR: Norway, Angola; IP: Madagascar, New Caledonia	?
Chaceon ramosae Manning, Tavares and Albuquerque, 1989	OC: Brazil (Espírito Santo to São Paulo)	600 - 1200
FAMILY XANTHIDAE		
Actae acantha (H. Milne Edwards, 1834)	OC: Florida, Gulf of Mexico, The West Indies and Brazil (Fernando de Noronha, Rocas and Amapá to Pernambuco)	IT - 25
Allactaea lithostrota Williams, 1974	OC: North Carolina, Florida, Gulf of Mexico, The West Indies, northern South America and Brazil (Rio de Janeiro to Rio Grande do Sul)	50 - 640
Banareia palmeri (Rathbun, 1894)	OC: Florida, Gulf of Mexico, The West Indies, northern South America and Brazil (Rocas, Pará to Espírito Santo)	10 - 150
Carpilius corallinus (Herbst, 1783)	OC: Florida, Gulf of Mexico, The West Indies, Colombia, Venezuela, Brazil (Ceará to Pernambuco; Fernando de Noronha)	IT - 20
Cataleptodius floridanus (Gibbes, 1850)	OC: Florida, Bermuda, Gulf of Mexico, The West Indies, Central America, northern South America, Brazil (Ceará to Rio Grande do Sul; Fernando de Noronha, Rocas); OR: Africa (Guinea to Gabon)	IT - 35
Domecia acanthophora acanthophora (Desbonne and Schramm, 1867)	OC: North Carolina, Bermuda, Florida, Gulf of Mexico, The West Indies, northern South America and Brazil (São Pedro and São Paulo Reefs, Paraíba and Pernambuco)	IT - 145
Edwardsium spinimanus (H. Milne Edwards, 1834)	OC: The West Indies, Guianas and Brazil (Ceará to Rio Grande do Sul)	15 - 55
Eriphia gonagra (Fabricius, 1781)	OC: North Carolina, Bermuda, Florida, Gulf of Mexico, The West Indies, Central America, northern South America and Brazil (Pará to Santa Catarina)	IT - 5
Euryozius sanguineus (Linnaeus, 1767)	OC: Brazil (Pará to Ceará and São Pedro and São Paulo Reefs); OR: Madeira Island to Angola, Ascension and Santa Helena Islands	20 - 120
Eurypanopeus abbreviatus (Stimpson, 1860)	OC: South Carolina, Florida, Gulf of Mexico, The West Indies, northern South America and Brazil (Ceará to Rio Grande do Sul)	IT - 5

Species	Distribution	
	Geographic	Vertical (depth, m)
Eurypanopeus depressus (Smith, 1869)	OC: Massachusetts through Florida to southern Texas, Dutch West Indies, Bermuda, Brazil (Paraiba) and Uruguay	?
Eurypanopeus dissimilis (Benedict and Rathbun, 1891)	OC: Florida, Gulf of Mexico, The West Indies and Brazil (Pernambuco to Santa Catarina)	?
Eurytium limosum (Say, 1818)	OC: Bermuda, Florida, Gulf of Mexico, The West Indies, Central America, northern South America and Brazil (Pará to Santa Catarina)	IT - 5
Garthiope barbadensis (Rathbun, 1921)	OC: Florida, Gulf of Mexico, The West Indies, and Brazil (Espírito Santo)	10 - 30
Garthiope spinipes (A. Milne Edwards, 1880)	OC: Bermuda, Florida, Gulf of Mexico, Venezuela and Brazil (Amapá to Espírito Santo)	IT - 60
Glyptoxanthus vermiculatus (Lamarck, 1818)	OC: Venezuela, Guianas and Brazil (Espírito Santo); OR: Angola	10 - 65
Hexapanopeus angustifrons (Benedict and Rathbun, 1891)	OC: Massachussets to North Carolina, Florida, Gulf of Mexico, The West Indies and Brazil (Pernambuco to Santa Catarina)	IT - 140
Hexapanopeus caribbaeus (Stimpson, 1871)	OC: The West Indies, northern South America and Brazil (Pará to Rio Grande do Sul)	IT - 55
Hexapanopeus paulensis Rathbun, 1930	OC: South Carolina, Florida, Gulf of Mexico, Brazil (Pará to Santa Catarina) and Uruguay (Maldonado and Rocha)	IT - 5
Hexapanopeus schmitti Rathbun, 1930	OC: Brazil (Ceará to Santa Catarina) and Uruguay	IT - 25
Leptodius floridanus (Gibbes, 1850)	OC: Florida, Bermuda to Brazil (São Paulo)	IT - 15
Melybia thalamita Stimpson, 1871	OC: Florida, Gulf of Mexico, The West Indies, northern South America and Brazil (Amapá to São Paulo)	10 - 200
Menippe nodifrons Stimpson, 1859	OC: Florida, Gulf of Mexico, The West Indies, Central America, northern South America, Guianas and Brazil (Maranhão to Santa Catarina); OR: Cape Verde Island to Angola	IT - 10
Micropanope nuttingi (Rathbun, 1898)	OC: North Carolina, Florida, Gulf of Mexico, The West Indies and Brazil (Amapá to São Paulo)	10 - 180
Micropanope pusilla A. Milne Edwards, 1880	OC: Florida, Gulf of Mexico, The West Indies and Brazil (Pará to Paraíba)	30 - 310
Micropanope sculptipes Stimpson, 1871	OC: North and South Carolina, Florida, Gulf of Mexico, The West Indies and Brazil (Amapá to Rio de Janeiro).	10 - 310
Micropanope urinator (A. Milne Edwards, 1881)	OC: North Carolina, Florida, Gulf of Mexico, The West Indies and Brazil (Pará and Maranhão)	150 - 460
Panopeus americanus Saussure, 1857	OC: Florida, Gulf of Mexico, The West Indies, Colombia, Venezuela and Brazil (Maranhão to Santa Catarina)	IT - 25
Panopeus austrobesus Williams, 1983	OC: Brazil (Rio de Janeiro to Rio Grande do Sul)	IT - 30
Panopeus bermudensis Benedict and Rathbun, 1981	OC: Florida, Gulf of Mexico, The West Indies, northern South America, Guianas and Brazil (Ceará to Santa Catarina); OP: Mexico to Peru	IT - 15
Panopeus harttii Smith, 1869	OC: Florida, Gulf of Mexico, The West Indies and Brazil (Maranhão to São Paulo); CA: Ascension Island	IT - 25
Panopeus herbstii H. Milne Edwards, 1834	OC: Boston, Massachussets, Bermuda and Brazil (Santa Catarina)	IT - 22

Species	Distribution: Geographic	Distribution: Vertical (depth, m)
Panopeus lacustris Desbonne, 1867	OC: Bermuda, Florida, The West Indies, Colombia and Brazil (Maranhão to Rio de Janeiro); OP: Hawaii	IT
**Panopeus margentus* Williams and Boschi, 1990	OC: Argentina (Mar del Plata)	SU
**Panopeus meridionalis* Williams, 1983	OC: Uruguay (Montevideo) and Argentina (Plata River to Mar del Plata)	SU
Panopeus occidentalis Saussure, 1857	OC: North Carolina to Florida, Gulf of Mexico, The West Indies, Central America, northern South America, Guianas and Brazil (Ceará to Santa Catarina)	IT - 20
Paractaea rufopunctata nodosa (Stimpson, 1860)	OC: North Carolina, Florida, Gulf of Mexico, The West Indies, northern South America, Brazil (Amapá to Rio de Janeiro) and Uruguay; CA: Ascension Island	IT - 220
Pilumnoides coelhoi Guinot and Macpherson, 1987	OC: Brazil (Bahia to Santa Catarina)	10 - 30
Pilumnoides hassleri A. Milne Edwards, 1880	OC: Brazil (Rio de Janeiro to Rio Grande do Sul), Uruguay and Argentina to Strait of Magellan	?
Pilumnus caribbaeus Desbonne and Schramm, 1867	OC: Florida, Gulf of Mexico, The West Indies, northern South America and Brazil (Paraíba to Santa Catarina)	IT - 55
Pilumnus dasypodus Kingsley, 1879	OC: North and South Carolina, Florida, Gulf of Mexico, The West Indies, northern South America and Brazil (Pará to Santa Catarina)	IT - 30
Pilumnus diomedeae Rathbun, 1894	OC: Gulf of Mexico, The West Indies and Brazil (Amapá to Rio Grande do Sul)	24 - 340
Pilumnus floridanus Stimpson, 1871	OC: North Carolina to Florida, Gulf of Mexico, Central America, The West Indies, Venezuela and Brazil (Alagoas to Bahia)	?
Pilumnus quoyi H. Milne Edwards, 1834	OC: Guianas and Brazil (Amapá to São Paulo)	IT - 100
Pilumnus reticulatus Stimpson, 1860	OC: The West Indies, Central America, northern South America, Brazil (Pará to Rio Grande do Sul), Uruguay and Argentina	IT - 75
Pilumnus spinosissimus Rathbun, 1898	OC: Florida, Gulf of Mexico, The West Indies and Brazil (Rio Grande do Norte to Santa Catarina)	5 - 20
Platypodiella spectabilis (Herbst, 1794)	OC: Bermuda, Florida, Gulf of Mexico, The West Indies, Venezuela and Brazil (Fernando de Noronha, Trindade Island and Rio Grande do Norte to Rio de Janeiro)	5 - 15
Platyxanthus crenulatus A. Milne Edwards, 1879	OC: Brazil (Santa Catarina to Rio Grande do Sul), Uruguay, Argentina (including Patagonia)	SU
Platyxanthus patagonicus A. Milne Edwards, 1879	OC: Brazil (Rio Grande do Sul), Uruguay and Argentina (including Patagonia)	> 60
Tetraxanthus bidentatus (A. Milne Edwards,1880)	OC: North Carolina, Gulf of Mexico, Brazil (Cape Frio and Santa Catarina) and Uruguay (Maldonado)	?
Tetraxanthus rathbunae Chace, 1939	OC: North Carolina, Florida, Gulf of Mexico, The West Indies and Brazil (Paraíba to Rio Grande do Sul)	20 - 500
Xanthodius denticulatus (White, 1847)	OC: Bermuda, Florida, Gulf of Mexico, The West Indies, Venezuela and Brazil (Ceará to Bahia; São Pedro and São Paulo Reefs)	IT - 15
Xanthodius parvulus (Fabricius, 1793)	OC: Bermuda, Florida, Gulf of Mexico, The West Indies, Venezuela and Brazil (Rocas and Fernando de Noronha)	IT - 10

Species	Distribution: Geographic	Distribution: Vertical (depth, m)
FAMILY GONEPLACIDAE		
Acidops cessacii (A. Milne Edwards, 1878)	OC: Brazil (Maranhão); OR: Africa: Cape Verde Islands, Senegal and Saint Thome and Annobon Islands	IT - 30
Bathyplax typhla A. Milne Edwards, 1880	OC: North Carolina to Florida, Gulf of Mexico, The West Indies and Brazil (Pernambuco and Alagoas)	400 - 1100
Chasmocarcinus cylindricus Rathbun, 1901	OC: Gulf of Mexico, The West Indies and Brazil (Rio de Janeiro and São Paulo)	15 - 1900
Chasmocarcinus peresi Rodrigues da Costa, 1968	OC: Brazil (Pará to Bahia)	15 - 25
Chasmocarcinus rathbuni Bouvier, 1917	OC: Brazil (Rio Grande do Sul)	120
Chasmocarcinus typicus Rathbun, 1898	OC: The West Indies, northern South America, Guianas and Brazil (Rio de Janeiro to Rio Grande do Sul)	25 - 200
Cycloplax pinnotheroides Guinot, 1969	OC: Guianas and Brazil (Amapá and Pará)	IT - 15
Cyrtoplax spinidentata (Benedict, 1892)	OC: The West Indies and Brazil (Pernambuco to Rio Grande do Sul)	10 - 150
Eucratopsis crassimanus (Dana, 1852)	OC: Florida, Gulf of Mexico, The West Indies and Brazil (Bahia to Rio Grande do Sul)	10 - 80
Euryplax nitida Stimpson, 1859	OC: North Carolina, Bermuda, Florida, Gulf of Mexico, The West Indies and Brazil (Piauí to Santa Catarina)	10 - 90
Frevillea hirsuta (Borradaile, 1916)	OC: North Carolina, Florida, Gulf of Mexico and Brazil (Amapá to Rio Grande do Sul)	70 - 150
Nanoplax xanthiformis (A. Milne Edwards, 1880)	OC: North Carolina to Florida, Gulf of Mexico, The West Indies, northern South America and Brazil (Amapá to Rio de Janeiro)	10 - 380
Neopilumnoplax americana (Rathbun, 1898)	OC: North Carolina, Georgia, Florida, Gulf of Mexico, Cuba and Brazil (Espírito Santo); IP: Arabic Sea	130 - 800
Panoplax depressa Stimpson, 1871	OC: Florida, Gulf of Mexico, The West Indies and Brazil (Amapá to Pernambuco)	10 - 100
Pseudorhombila octodentata Rathbun, 1906	OC: The West Indies and Brazil (Rio de Janeiro to Rio Grande do Sul)	10 - 200
Pseudorhombila quadridentata (Latreille, 1828)	OC: Florida, Gulf of Mexico, The West Indies and Brazil (Bahia)	55
Speocarcinus carolinensis Stimpson, 1859	OC: North Carolina to Florida, Gulf of Mexico, The West Indies and Brazil (Amapá, São Paulo and Rio Grande do Sul)	IT - 150
Speocarcinus meloi D'Incao and Gomes da Silva, 1992	OC: Brazil (Rio Grande do Sul)	50 - 160
FAMILY PINNOTHERIDAE		
Clypeasterophilus stebbingi (Rathbun, 1918)	OC: Florida, Gulf of Mexico and Brazil (São Paulo and Santa Catarina)	5 - 10
Dissodactylus crinitichelis Moreira, 1901 = D. encopei Rathbun, 1901	OC: North Carolina, Florida, Gulf of Mexico, The West Indies, northern South America, Brazil (Pará to Rio Grande do Sul) and Argentina	5 - 50
Fabia insularis (Melo, 1971)	OC: Brazil (Rio de Janeiro to Rio Grande do Sul) and Argentina	2 - 40
Fabia sebastianensis Rodrigues da Costa, 1970	OC: Brazil (São Paulo)	5 - 20
Parapinnixa bouvieri Rathbun, 1918	OC: South Carolina, Florida, Gulf of Mexico, The West Indies and Brazil (Amapá)	5 - 75

Species	Distribution	
	Geographic	Vertical (depth, m)
Parapinnixa hendersoni Rathbun, 1918	OC: Florida, Gulf of Mexico, The West Indies, Venezuela and Brazil (Maranhão to Espírito Santo)	40 - 60
* *Pinnaxodes chilensis* (A. Milne Edwards, 1837)	OC: Argentina; OP: Equador to Chile	5 - 10
Pinnaxodes tomentosus Ortmann, 1894	OC: Brazil	?
Pinnixa brevipollex Rathbun, 1898 (= *Pinnixa rapax* Bouvier, 1917)	OC: Brazil (Rio de Janeiro to Rio Grande do Sul), Uruguay and Argentina	30 - 70
Pinnixa aidae Righi, 1967	OC: Brazil (Alagoas to São Paulo)	5 - 10
Pinnixa chaetopterana Stimpson, 1860	OC: Massachusetts to North Carolina, Florida, Gulf of Mexico and Brazil (Pernambuco to Rio Grande do Sul)	IT - 60
Pinnixa cristata Rathbun, 1900	OC: North Carolina to Florida, Gulf of Mexico, Central America and Brazil (Amapá, Pernambuco and São Paulo)	IT - 10
Pinnixa patagoniensis Rathbun, 1918	OC: Brazil (Rio de Janeiro to Rio Grande do Sul), Uruguay and Argentina (Gulf of San Matias)	5 - 10
Pinnixa sayana Stimpson, 1860	OC: Massachusetts to North Carolina, Florida, Gulf of Mexico and Brazil (Amapá to Rio Grande do Sul)	10 - 75
Pinnotheres emiliai (Melo, 1971)	OC: Brazil (Rio de Janeiro and Rio Grande do Sul) and Argentina (Mar del Plata)	10 - 21
Pinnotheres garthi Fenucci, 1975	OC: Brazil (Rio Grande do Sul) and Argentina (Mar del Plata, Gulfs of Necochea and Saint Mathias)	5 - 10
Tumidotheres maculatus (Say, 1818)	OC: Massachusetts to Florida, Gulf of Mexico, The West Indies, Brazil (Alagoas to Santa Catarina), Uruguay and Argentina	IT - 50
Zaops ostreum (Say, 1817)	OC: Massachusetts to South of Florida, Gulf of Mexico, The West Indies and Brazil (Pernambuco to Santa Catarina)	IT - 10
FAMILY GRAPSIDAE		
Aratus pisonii (H. Milne Edwards, 1837)	OC: Florida, Gulf of Mexico, The West Indies, northern South America, Guianas and Brazil (Piauí to São Paulo); OP: Nicaragua to Peru, Chile	SM and MA
Armases angustipes (Dana, 1852)	OC: Mexico, The West Indies and Brazil (Ceará to Santa Catarina)	SM and MA
Armases benedicti (Rathbun, 1897)	OC: Florida, Gulf of Mexico, Venezuela, Guianas and Brazil (Amapá and Pará)	SM and MA
Armases miersii (Rathbun, 1897)	OC: Central America, northern South America, Brazil and Uruguay (Montevideo: Ratas Island)	SM and MA
Chasmagnathus granulata Dana, 1851	OC: Brazil (Rio de Janeiro to Rio Grande do Sul), Uruguay and Argentina	SM and MA
Cyclograpsus integer H. Milne Edwards, 1837	OC: Florida, Gulf of Mexico, Central America, northern South America and Brazil (Ceará to Santa Catarina); OR: Cape Verde Island to Senegal; IP	SM and MA
Cyrtograpsus angulatus Dana, 1851	OC: Brazil (Rio de Janeiro to Rio Grande do Sul), Uruguay (Montevideo) and Argentina (Rawson, Chubut and Patagonia); OP: Peru and Chile	IT
Cyrtograpsus affinis (Dana, 1851)	OC: Brazil (Rio de Janeiro to Rio Grande do Sul) and Argentina; OP: Peru and Chile	IT
Cyrtograpsus altimanus Rathbun, 1914	OC: Brazil (Rio Grande do Sul), Uruguay and Argentina (including Patagonia)	IT

Species	Distribution	
	Geographic	Vertical (depth, m)
Euchirograpsus americanus A. Milne Edwards, 1880	OC: North and South Carolina, Florida, Gulf of Mexico, The West Indies, Colombia, Venezuela and Brazil (Rio Grande do Sul)	30 - 510
Euchirograpsus kingsleyi (Miers, 1885)	OC: Brazil (Rio Grande do Sul); OR: South Africa	30 - 320
Geograpsus lividus (H. Milne Edwards, 1837)	OC: Bermuda, Florida, Gulf of Mexico, The West Indies, northern South America and Brazil (Rio de Janeiro to Rio Grande do Sul); OR: Senegal to Angola and Cape Verde Islands; OP: California to northern Chile, Galapagos Islands and Hawaii	IT
Goniopsis cruentata (Latreille, 1803)	OC: Bermuda, Florida, Gulf of Mexico, The West Indies, Guianas and Brazil (Fernando de Noronha, Pará to Santa Catarina); OR: Senegal to Angola	IT
Grapsus grapsus (= G. adcensionis) (Linnaeus, 1758)	OC: Bermuda, Florida, Gulf of Mexico, The West Indies, Colombia, Venezuela and Brazil (Ceará to Espírito Santo; Fernando de Noronha, Rocas and Trindade); OP: California to Chile and Galapagos Islands	IT
Metasesarma rubripes (Rathbun, 1897)	OC: Central America, northern South America, Guianas, Brazil (Ceará to Rio Grande do Sul), Uruguay (Montevideo) and Argentina	SM and MA
Pachygrapsus corrugatus (von Martens, 1872)	OC: The West Indies and Brazil (São Pedro and São Paulo Reefs)	IT
Pachygrapsus gracilis (Saussure, 1858)	OC: North Carolina, Florida, Gulf of Mexico, The West Indies, northern South America, Guianas and Brazil (Trindade Island, Ceará to Rio Grande do Sul); OR: Cape Verde Island to Angola, Mediterranean Sea; OP: California to Peru	IT
Pachygrapsus transversus (Gibbes, 1850)	OC: Bermuda, North Carolina to Florida, Gulf of Mexico, The West Indies, northern South America, Brazil (Trindade Island, Ceará to Rio Grande do Sul) and Uruguay; OR: Cape Verde Island to Angola, Mediterranean Sea; OP: California to Peru	IT
Percnon gibbesi (H. Milne Edwards, 1853)	OC: North Carolina, Bermuda, Florida, Gulf of Mexico, The West Indies and Brazil (Fernando de Noronha); OR: Azores to South Africa; OP: California to Chile, Galapagos Islands and Clipperton Island	IT
Plagusia depressa (Fabricius, 1775)	OC: North and South Carolina, Florida, Gulf of Mexico, The West Indies and Brazil (Fernando de Noronha, Rocas, São Pedro and São Paulo Reefs, Trindade Island, Ceará to Bahia); OR: Azores and Madeira, Senegal to Angola	IT
Planes cyaneus Dana, 1851	OC: Brazil (Rio Grande do Norte to Rio Grande do Sul), Uruguay and Argentina; OR: Tropical Africa and Santa Helena Island; IP and OP: California, Peru and Chile	IT - 15
**Planes minutus* (Linneo, 1758)	OC: Uruguay; Pacific ocean	?
Sesarma crassipes Cano, 1889	OC: Costa Rica and Brazil (Pernambuco and Bahia)	SM and MA
Sesarma rectum Randall, 1840	OC: Venezuela, Guianas and Brazil (Amapá to Santa Catarina)	SM and MA

Species	Distribution: Geographic	Distribution: Vertical (depth, m)
FAMILY GECARCINIDAE		
Cardisoma guanhumi Latreille, 1825	OC: Bermuda, Florida, Gulf of Mexico, The West Indies, Colombia, Venezuela and Brazil (Ceará to São Paulo)	MA
Gecarcinus lagostoma H. Milne Edwards, 1835	OC: Florida, The West Indies, Venezuela and Brazil (Fernando de Noronha, Rocas and Trindade); CA: Ascension Island	MA
FAMILY OCYPODIDAE		
Ocypode quadrata (Fabricius, 1787)	OC: Florida, Bermuda, Gulf of Mexico, Central America, The West Indies, northern South America, Guianas and Brazil (Fernando de Noronha, Pará to Rio Grande do Sul)	IT
Uca burgersi Holthuis, 1967	OC: Florida, Gulf of Mexico, The West Indies, Venezuela and Brazil (Maranhão to São Paulo)	MA
Uca cumulanta Crane, 1943	OC: Central America, northern South America, Guianas and Brazil (Pará to Rio de Janeiro)	MA
Uca leptodactyla Rathbun, 1898	OC: Florida, Gulf of Mexico, The West Indies, Venezuela and Brazil (Maranhão to Santa Catarina)	MA
Uca maracoani (Latreille, 1802-1803)	OC: The West Indies, Venezuela, Guianas and Brazil (Maranhão to Paráná)	MA
Uca mordax (Smith, 1870)	OC: Gulf of Mexico, Central America, northern South America, Guianas and Brazil (Pará to São Paulo)	MA
Uca rapax (Smith, 1870)	OC: Florida, Gulf of Mexico, The West Indies, Venezuela and Brazil (Pará to Santa Catarina)	MA
Uca thayeri Rathbun, 1900	OC: Florida, Gulf of Mexico, The West Indies, Guatemala, Panama, Venezuela and Brazil (Maranhão to Santa Catarina)	MA
Uca uruguayensis Nobili, 1901	OC: Brazil (Rio de Janeiro to Rio Grande do Sul), Uruguay and Argentina	MA
Uca victoriana von Hagen, 1987	OC: Brazil (Espírito Santo)	MA
Uca vocator (Herbst, 1804)	OC: Gulf of Mexico, The West Indies, Central America, northern South America, Guianas and Brazil (Pernambuco to Santa Catarina)	MA
Ucides cordatus (Linnaeus, 1763)	OC: Florida, Gulf of Mexico, The West Indies, Central America, northern South America, Guianas and Brazil (Pará to Santa Catarina)	MA
FAMILY PALICIDAE		
Palicus acutifrons (A. Milne Edwards, 1880)	OC: Brazil (Bahia and Espírito Santo)	10 - 30
Palicus affinis A. Milne Edwards and Bouvier, 1899	OC: Florida, Gulf of Mexico, The West Indies, Guianas and Brazil (Maranhão to Espírito Santo)	20 - 215
Palicus alternatus Rathbun, 1897	OC: North Carolina, Florida, Gulf of Mexico and Brazil (Rio de Janeiro to Rio Grande do Sul)	10 - 110
Palicus dentatus (A. Milne Edwards, 1880)	OC: Florida, Gulf of Mexico, The West Indies and Brazil (Rio de Janeiro to Rio Grande do Sul)	30 - 140
Palicus faxoni Rathbun, 1897	OC: North Carolina to Florida, Gulf of Mexico, Yucatan and Brazil (Rio Grande do Norte to Rio de Janeiro)	35 - 95
Palicus obesus (A. Milne Edwards, 1880)	OC: Florida, Gulf of Mexico, Mexico and Brazil (Rio de Janeiro to Rio Grande do Sul)	20 - 220
Palicus sica (A. Milne Edwards, 1880)	OC: Florida, Gulf of Mexico, The West Indies and Brazil (Amapá to Rio Grande do Sul)	10 - 190

Species	Distribution — Geographic	Distribution — Vertical (depth, m)
FAMILY CRYPTOCHIRIDAE		
Opecarcinus hypostegus (Shaw and Hopkins, 1977)	OC: Florida, Gulf of Mexico, The West Indies and Brazil (Pernambuco); CA: Ascension Island	SU - 27
Troglocarcinus corallicola Verril, 1908	OC: Bermuda, Florida, Gulf of Mexico, The West Indies and Brazil (Maranhão to Bahia; Fernando de Noronha, Rocas); CA: Ascension and Santa Helena Islands; OR: Gabon, Saint Tome and Annobon	SU - 75

Table 1. The geographic and bathymetric distribution of brachyuran species recorded from the South Atlantic, but excluding species that are endemic to the Southeast Atlantic. Species marked with an asterisk were not recorded along the Brazilian coast. The depth distribution corresponds to the minimum and maximum depth of occurrence for the species. This list is based on Williams (1984), Boschi *et al.* (1992), Zolessi and Philippi (1995), Carmona and Conde (1996), Martins and D'Incao (1996), and Melo (1996). (OC: Occidental Atlantic; OR: Oriental Atlantic; CA: Central Atlantic; OP: Oriental Pacific; IP: Indo Pacific; IT: intertidal zone; SU: sublittoral zone; SM: salt marshes; MA: mangrove).

Exopod: the outer branch of a *biramous* appendage.

Flagellum (pl. flagella): distal *endopod* portion of megalopal antenna beyond the *peduncle* that consists of several segments.

Furca (pl. furcae): the forked end of the *abdomen* in zoeal stages.

Ischium (pl. ischia): the third most basal segment of an appendage, or first segment of *endopod* articulating with *basis*.

Mandible (abbr.: md): third pair of appendages; first pair of mouthparts.

Maxilla (abbr.: mx2): fifth pair of appendages; third pair of mouthparts.

Maxillule (abbr.: mx1): fourth pair of appendages; second pair of mouthparts.

Maxillipeds (abbr.: mxp1, mxp2...): sixth to eighth pair of appendages; the three most posterior pairs of mouthparts, the first two of which are used for swimming in zoeal stages.

Palp: in the megalopa the distal 1-3 segmented portion of the *maxilliped endopod* and the segmented structure attached to the *mandible*.

Peduncle: the proximal non-branched segments of the *antenna* and *antennule* in the megalopa.

Pereopods: ninth to thirteenth pair of appendages; the *chelipeds* plus four pairs of walking legs.

Pleopods: fourteenth to eighteenth pair of appendages on the second to sixth abdominal *somites*.

Protopod: the proximal part of a crustacean limb that lacks lateral branches, in zoeae usually consisting of the coxa and basis which may be fused, or of more segments in the megalopa (*peduncle*); especially here the basal part of the zoeal *antenna* from which arises the *spinous process*.

Ramus (pl. rami): a branch of any branched limb; thus a *biramous* limb is divided into *exopodite* and *endopodite*; a *uniramous* limb has only one branch.

Rostrum: anterior median extension of the *carapace* often forming a distinct *spine* or spines.

Rostral spine: see *rostrum*.

Seta (pl. setae): a bristle, spine- or hair-like structure, with basal socket, and produced as an extension of the cuticle; mostly on appendages; setal shaft may be smooth (simple seta), or feathery (plumose seta).

Scaphognathite: *epipod* of the *maxilla* which regulates water flow past the respiratory surface.

Somite: a segment of the body, not of the appendage.

Spine: direct and continuous outgrowth of exoskeleton, forming a gross morphological projection.

Spinous process: in zoeae an extention of the antennal protopodite bearing small spines.

Telson: the unpaired appendage on the hindmost abdominal *somite* (see abdomen) which bears the anus.

Thorax: seventh to fourteenth *somites*; in Brachyura always fused with the six head somites to form a *cephalothorax*.

Uniramous: single-branched, as opposed to *biramous* or two-branched.

Uropod: paired appendage on sixth abdominal somite (=pleopod 5).

Group	Nauplius	Protozoea	Mysis	Zoea	Phyllosoma	"Eryoneicus"	Decapodid
Dendrobranchiata							
Penaeoidea	5, 6 (8)	3	2-5	-	-	-	few
Sergestoidea	2	3	2	-	-	-	many
Pleocyemata							
Stenopodidea	-	-	-	1-9	-	-	1
Caridea	-	-	-	many	-	-	1(2,3)
Scyllaridae, Palinuridae	-	-	-	-	6-15	-	1 (puerulus)
Nephropidae, Polychelidae	-	-	-	-	-	3	1
Thalassinidea	-		-	2-many	-	-	1
Anomura	-	-	-	2-many	-	-	1(glaucothöe)
Brachyura	-	-	-	2-many	-	-	1-2 (megalopa) mostly 1

Table 2. Number of larval stages in each phase for different groups of decapod Crustacea (modified from Williamson, 1982).

Recognition of the main decapod larval forms

According to Williamson (1982) and Gore (1985), the first larvae produced by decapods usually consist of a free-swimming or motile planktonic form that hatches from the egg. These larvae hatch as different types, ranging from morphologically relatively simple forms termed nauplii, among decapods found in dendrobranchiate shrimps, to more complex forms found in pleocyematids, termed prezoea, zoea, naupliosoma or phyllosoma. Subsequent stages are either a megalopa, glaucothöe, puerulus or decapodid (Table 2). The collective term decapodid is used here as by Williamson (1982) and Felder *et al.* (1985).

The distinction between each larval phase is mainly based on the appendages used for locomotion. The phases are:

1. **Nauplius** (several stages): It is characterized by a single small median eye and propulsion is by means of three pairs of head appendages (antennae and mandibles). This type of larva belongs to members of the Dendrobranchiata.
2. **Protozoea** (three stages): This larva has a pair of compound eyes, an antenna that is segmented to the base, locomotion that is shared between the second antennae and exopods of the first two maxillipeds, and a telson with two blunt cylindrical rami. This kind of larva belongs to representatives of the Dendrobranchiata.
3. **Prezoea** (one stage): It is the last embryonic stage, which precedes the first stage zoea; its free life is usually only a matter of minutes before molting again. This stage is totally enveloped by a cuticle and, unlike for other phases, the appendages do not have setae. Movement is limited to abdominal flexion. This kind of larva can appear in Brachyuran development.
4. **Zoea** (several stages): It is similar to the protozoea, from which it differs by the means of locomotion. In early zoeae, propulsion is by means of exopods of maxillipeds and in some older zoeae also by exopods of pereopods. The pleopods can be present but are not natatory. Zoeae are found as older larvae of dendrobranchiates or as early larvae of pleocyemates.
5. **Mysis** (several stages): With setose swimming exopods on the maxillipeds and pereopods; pleopods are present starting with the second stage but lack setae and are not yet functional. Locomotion is by exopods of the thoracopods. This larval form can be found among penaeideans after the zoeal phase.
6. **Phyllosoma** (several stages): The body is dorsoventrally flattened, anteriorly pear-shaped, and wider than long or as long as wide; third maxillipeds with or without exopod, abdomen one tenth to one fourth of total length, and locomotion is by cephalothoracic maxillipeds with well developed and numerous natatory setae on the exopods. These larvae are found among scyllarid and palinurid lobsters.

7. **"Eryoneicus"** (several stages): Body not extremely compressed; eyes rarely covered by carapace; at least two pairs of functional thoracopods; antennal exopod unsegmented or segmented at tip only; abdomen one third of total length (excluding rostrum) (Nephropidae and Polychelidae). There is some debate if this larva is equivalent to a zoeal or post-larval phase (Gurney, 1942; Williamson, 1982).
8. **Decapodid** (usually one stage): This is the transitional stage between the zoeal and juvenile growth phase. The locomotory function has shifted to setose pleopods for swimming but pereopods for crawling are also present.
   8.1. **Megalopa:** This term is usually used for brachyuran and some anomuran decapodids. It looks like a small crab with an extended abdomen bearing ventral pairs of pulsating setose pleopods while swimming. The pereopods are also well developed, the first pair being chelipeds.
   8.2. **Glaucothöe:** This usually refers to an anomuran pagurid decapodid. The first pereopod is chelated; the 5th pereopod and, sometimes also the 4th, are distinctly smaller than the other pereopods.
   8.3. **Puerulus:** is usually used for a palinuroidean decapodid. It looks like a small spiny lobster.
   8.4. **Penaeoidean decapodid:** The most characteristic feature is that swimming shifts during this stage from the thorax to the abdomen.

Key to recognize zoeal larvae of major decapod groups (Fig. 1)

1 Telson cylindrical in cross section 2
1a Telson flattened 3
2 Telson with two blunt rami: **protozoea** (Dendrobranchiata) (Fig. 1A, B)
2a Telson not produced into blunt rami 4
3 Telson furcated: **zoea** (Brachyura) (Fig. 1M)
3a Telson not furcated 5
4 Body extremely flattened dorsoventrally; forebody pear-shaped, wider than long or as long as wide; maxilliped 3 with or without exopod; abdomen one tenth to one fourth of total length: **Phyllosoma** (Scyllaridae and Palinuridae) (Fig. 1F)
4a Body not extremely flattened; eyes rarely covered by carapace; at least two pairs of functional thoracopods with chelae; antennal exopod unsegmented or segmented at tip only; abdomen one third of total length (excluding rostrum): **Eryoneicus** (Polychelidae) (Fig. 1G); **zoea** (Nephropoidea) (Fig. 1H)
5 Telson spatula-like, with first marginal process never as a spine; carapace without dorsal and lateral spines; antennal scale segmented: **zoea** (Caridea) (Fig. 1D)
5a Telson subtriangular 6
6 Lateral margin of the telson serrate and rostral spine well developed: **zoea** (Stenopodidea) (Fig. 1C)
6a Lateral margin of the telson smooth 7
7 Posterior border of the telson bearing a conspicuous median spine, abdominal somites 2-6 with prominent dorsal median spine: **zoea** (Thalassinidea) (Fig. 1E)
7a Carapace longer than wide; telson formula 7+7, the first lateral process spinous and the second one hair-like; antennal scale more or less developed: **zoea** (Anomura and Dromiacea) (Fig. 1I, K, L)

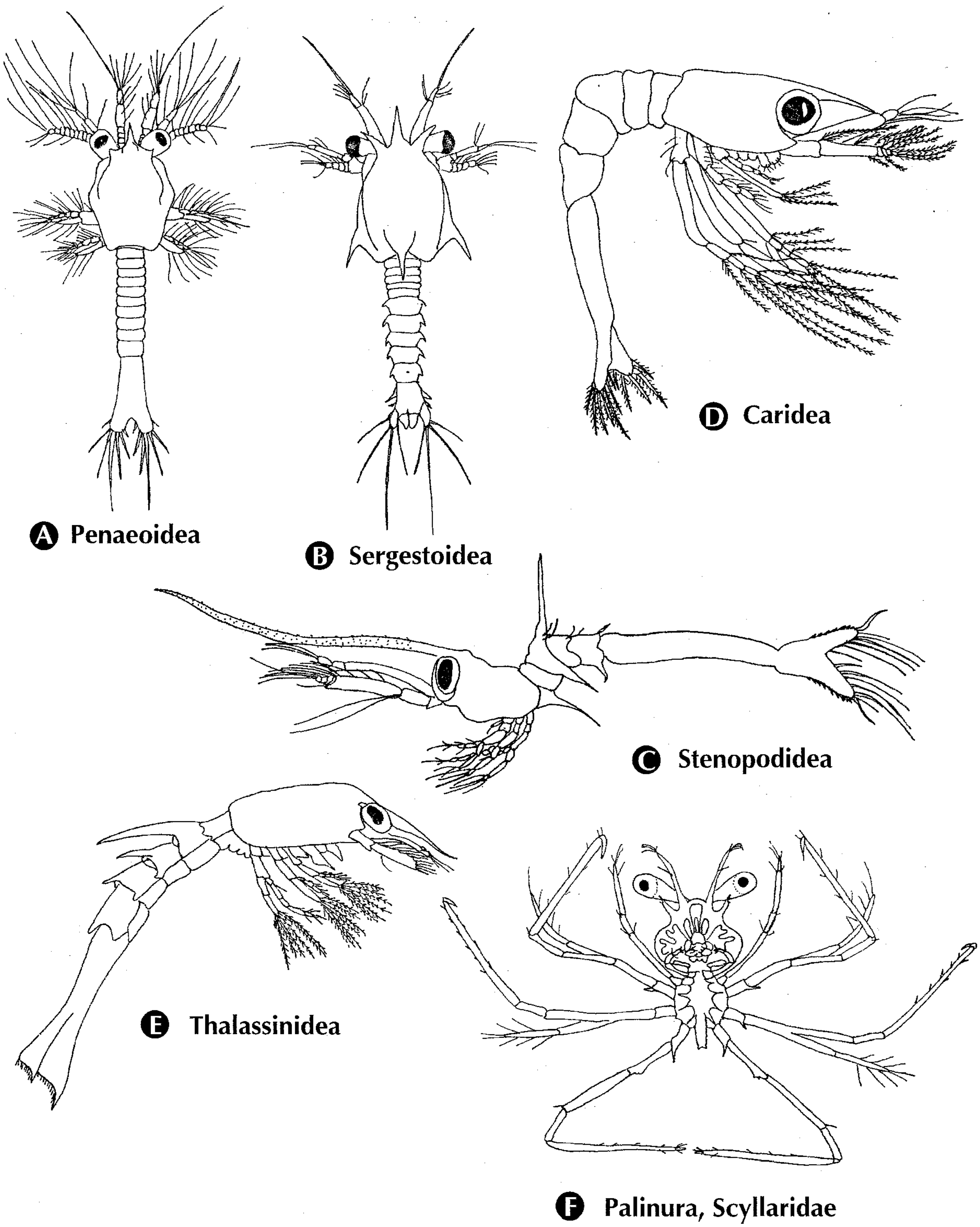
During the zoeal phase each larval stage is easily recognized by morphological features, particularly the long swimming (natatory) setae on maxilliped appendages and characteristics of the abdomen (Table 3).

General morphology of brachyuran larvae

Zoeal phase (Fig. 2)

The main body, or cephalothorax, of a zoea is covered by a carapace with free ventral and posterolateral margins that enclose the proximal parts of incipient thoracic limbs, gill buds and internal organs. A pair of large eyes are located anteriorly and several paired appendages are inserted ventrally. A segmented flexible abdomen terminating in a telson is attached to the cephalothorax. The cephalothorax and abdomen are pigmented but these chromatophores fade in preserved specimens and thus are not shown in figures. Due to the arrangement of prominent spines on the carapace in the majority of larvae, zoeae of species in the area have a more or less upright triangular carapace, but in some species (Dromiidae, Homolidae and Latreilliidae) zoeae have a shrimp-like carapace that is longer than wide. Typically, the carapace bears a rostral, dorsal and two lateral spines but other combinations are possible.

GENERAL DECAPOD LARVAL FORMS



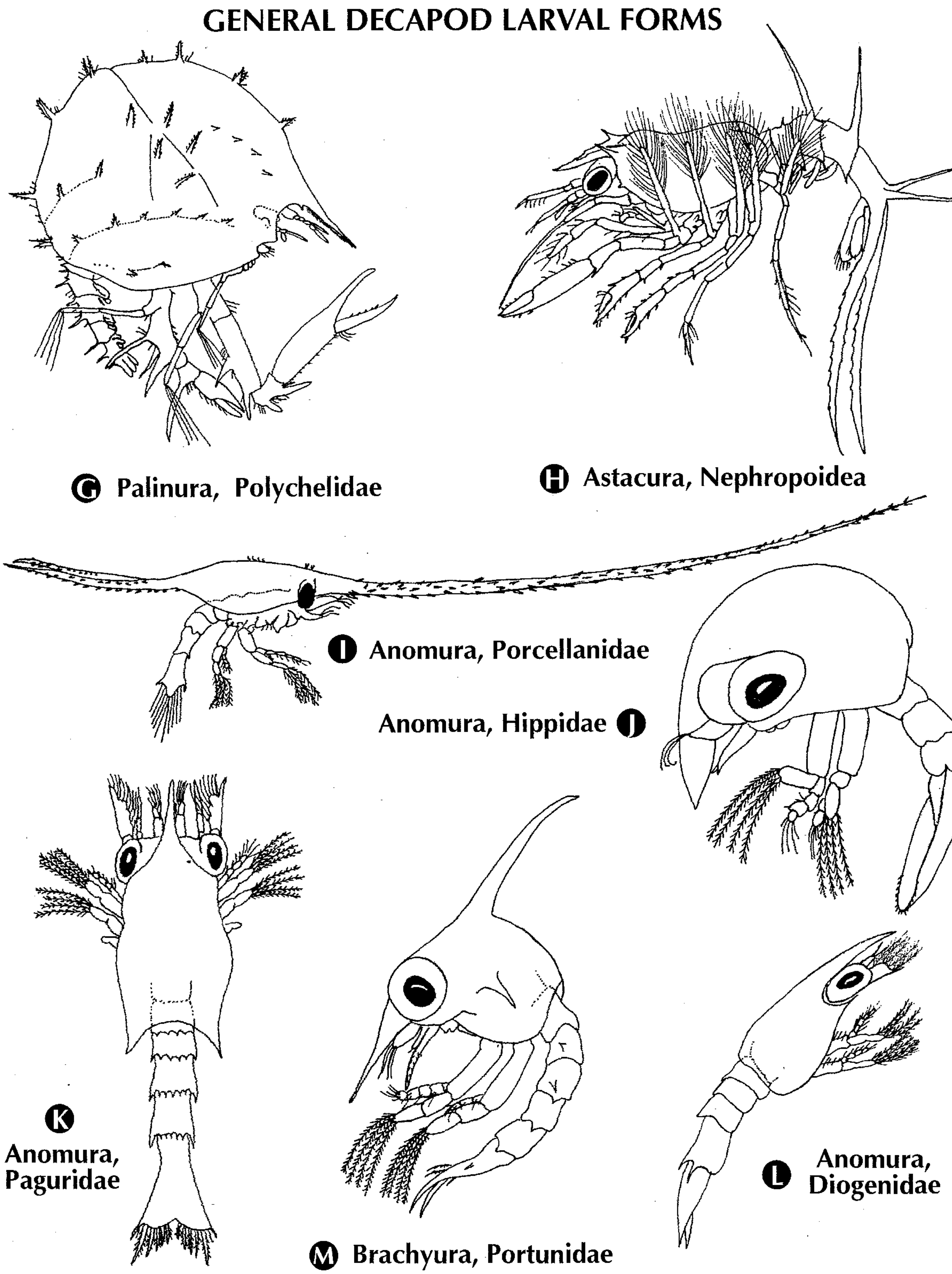


Fig. 1. General decapod larval forms. Sources, from Boschi (1981): A, B, K, M; from Gore (1970): I; from Hebling and Fransozo (1982): L; from Knight (1967): J (originally fig. 1 on p. 63); from Rodrigues (1976): E; from Gurney (1942): G, H; from Williamson (1976): C; from Williamson (1982): F.

PHASE/STAGE	FEATURES
ZOEA I	Eyes sessile; antennule and antenna without endopod buds; first two maxillipeds natatory, exopod segmented and distally with 4 long setae; third maxilliped absent or not visible; no uropods; telson not separated from 6th abdominal somite, groups with typical forked telson usually with 3 pairs of medial setae.
ZOEA II	Eyes stalked; antennule and antenna endopod first appear as buds; first two maxillipeds with 6 natatory setae on exopods; developing third maxilliped may be present under carapace; no uropods; telson usually not separated from the 6th abdominal somite (e.g. except Majidae), furcal arch may bear 4 pairs of setae.
ZOEA III	Eyes stalked; mandibular palp may be present as primordia; first two maxillipeds with 8 natatory setae on exopods; developing third maxilliped usually present; developing pereopods and pleopods may be present; uropod buds present; telson separated from 6th abdominal somite; may have additional setae on furcal arch.
ZOEA IV (and older stages)	Eyes stalked; mandible with palp primordia; exopod of maxillipeds with 10 or more natatory setae; pleopod and pereopod buds more developed than previous stages but not yet functional; telson separated from 6th abdominal somite; may have additional setae on furcal arch.
DECAPODID (MEGALOPA)	Eyes stalked; mandible with setose palp; maxillipeds no longer natatory, now functional mouthparts; pereopods complete and functional, the first one chelate; pleopods biramous, segmented and setose; uropods setose.

Table 3. General characters to recognize the stages of brachyuran larval phases (exceptions apply, especially among lower Brachyura, e.g. Dromiidae, Homolidae and Raninidae).

The abdomen of the first zoeal stage is composed of five articulating somites and a terminal telson (by others the telson is considered a separate entity from the abdomen). Older zoeae acquire a sixth somite at some later stage, except in Leucosiidae and some Pinnotheridae. On abdominal somites 2 and 3 a pair of dorsolateral processes are present in almost all species. The posterolateral margins of somites 3-5 vary in shape from rounded to bearing subacute or acute processes. The pleopod buds arise ventrally on somites 2-6 in older zoeae.

The shape of the telson remains more or less constant throughout development. In the majority of crab larvae the posterolateral portions of the telson are extended into conspicuous furcae. The remaining posterior margin of the telson is formed into a slight median lobe in some Pinnotheridae, is convex in Leucosiidae but is variably concave in most other species. The posterior margin also bears plumodenticulate setae. Zoeae of Dromiacea have ten setae, Dorippidae only two, and in all other brachyurans studied there are six setae in the first stages, with additional setae added in later stages during development in the majority of brachyrhynchs. The outer lateral spine of the telson is present in nearly all previously studied species. The dorsal spine is absent in Dromiacea, Oxyrhynchs, but it is developed in all stages of most brachyurans.

The antennule is represented by a subcylindrical exopod with an undifferentiated protopod. The exopod bears aesthetascs and sometimes additional simple setae, whose number varies with the zoeal stage.

The antenna is well developed in zoeal stages of all species in the area, except for *Zaops* and *Persephona*, where it is represented only as a small bud. Three general types of antennae are distinguished:

In Dromiacea occurs a broad, somewhat flattened, setose exopod, the endopod is subcylindrical and bears terminal setae;

In Hymenosomatidae and some Grapsidae and Xanthidae species, the antennal exopod is absent or reduced to a small simple seta, small setose process or a minute articular process bearing 1-2 terminal simple setae;

In Parthenopidae, all other oxyrhynchs and brachyrhynchs the antenna is more developed - the exopod is long and often extends to the distal half of the spinous process which is well developed and reaches from less than half the length to almost the tip of the rostrum. The endopod bud can be distinguished starting in the second stage.

The mandible is composed of distal incisor and molar processes and in some species an endopodite bud may occur basally in the last zoeal stage.

The maxillule is composed of an endopod and a protopod; from the latter arise the basis and coxa.

The maxilla is composed of four endites: endopod, basis and coxa, and the scaphognathite, which in all species is developed into an elongated lobe. The scaphognathite margin bears a consistent number of plumose setae in the first zoeal stage but the number of setae varies within a species in later stages.

The first maxilliped consists of a coxa that is often imperfectly demarcated from the adjoining basis which bears a characteristic setal pattern that in most species remains unchanged during zoeal development; from the distal portion of the basis arises an endopod and exopod. The setose endopod is 5-segmented in all species studied. The unsegmented, bisegmented or partially bisegmented exopod of all species has long plumose natatory setae distally, starting with four in the first stage, to as many as 13 in older zoeae (Brossi-Garcia and Rodrigues, 1993).

The second maxilliped is similar to the first except for the endopod which is 4-segmented in the early larval stages of Dromiacea and 3-segmented in other brachyuran zoeae studied. Exceptions include *Zaops*, where only two segments can be recognized, and in *Persephona,* in which the endopod is unsegmented.

The third maxilliped can appear under the carapace as a developing non-functional bifurcated and unsegmented structure in early zoeal stages of some species but it usually occurs in later stages in species with more zoeal stages.

Developing pereopods appear as gradually growing buds under the carapace during zoeal development.

The megalopa (Fig. 3)

The body of a megalopa is formed by an oval or rectangular cephalothorax, externally composed of a dorsal carapace and a ventral sternum, plus a segmented abdomen. Large stalked pigmented eyes and other appendages emanate from the cephalothorax, as do swimming appendages from the abdomen. Both the cephalothorax and abdomen are pigmented in live or freshly preserved specimens. This is not shown in the figures.

The carapace frequently has a rostrum, except in *Zaops*. The carapace can de ornamented by protuberances and bear a posteriorly directed median spine (*Parthenope*). The pereopods (p1, p2, p3, p4, p5) are fully formed, the first one being chelate. The abdomen is composed of six somites in all megalopae studied, except in *Zaops* and *Persephona*, in which only five somites are present, or the 6th is incipiently formed. Ventrally the abdomen bears functional biramous pleopods on somites 2-5, and a pair of uniramous uropods on somite 6 in most species.

The antennule is developed as a stout 3-segmented peduncle bearing an endopod and exopod. The exopod segments are often armed with aesthetasc setae.

The antenna is composed of a peduncle (protopod) with 4 segments and a multisegmented flagellum (endopod).

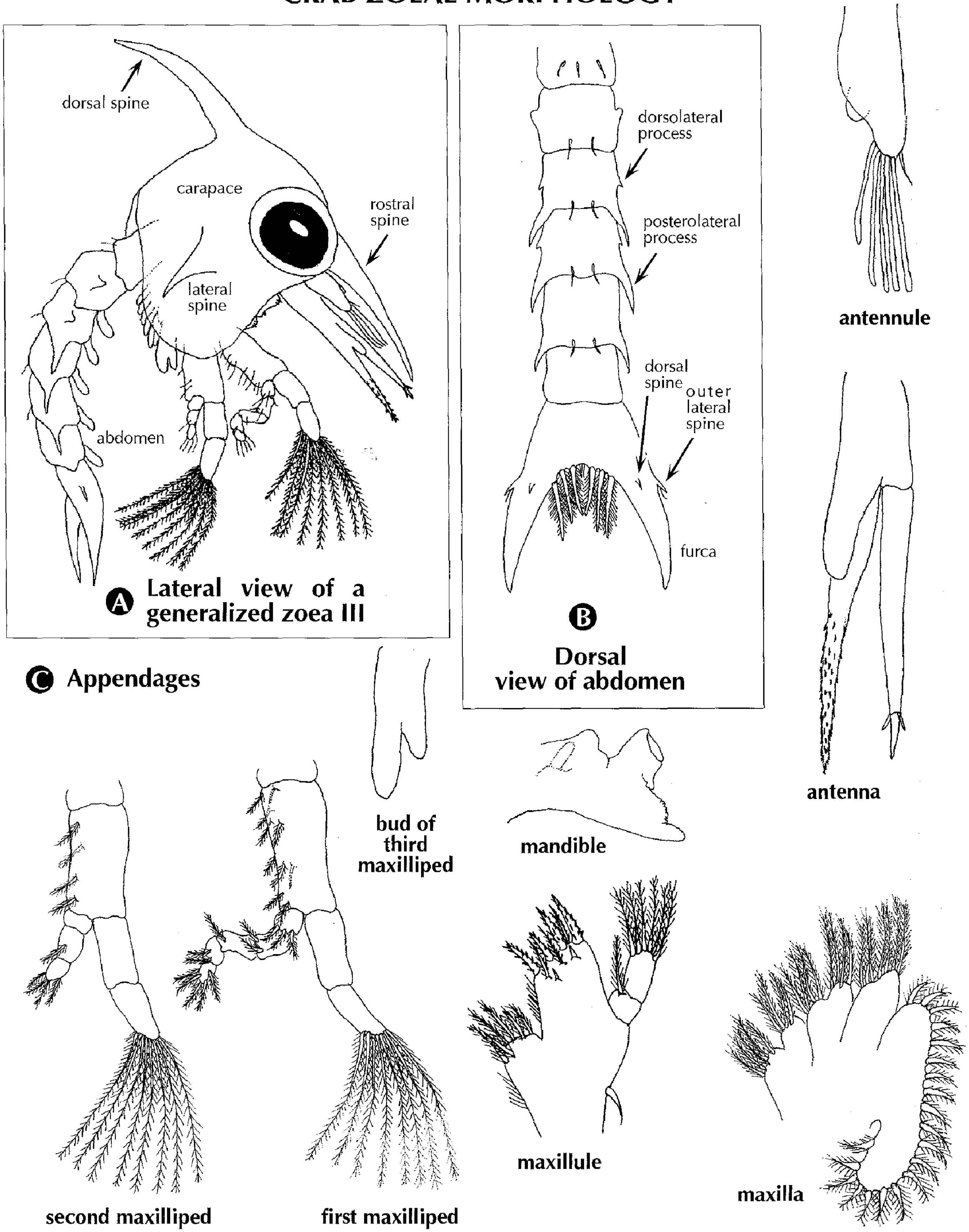
The mandibles no longer have distinct molar and incisor portions but a cutting edge instead. There is a dorsal palp that usually bears setae.

The maxillule and maxilla have changed little since the zoeal stage, except that the endopod now is usually reduced.

The first maxilliped has a protopod from which arise broad coxal and basial segments. A narrow endopod and a 2-segmented exopod have developed. The outer margin of the protopod has an epipod with a variable number of plumodenticulate setae.

The second maxilliped has a small protopod from which arises an endopod with four clearly demarcated segments and a 2-segmented exopod. For known species there is no epipod emanating from the protopod.

CRAB ZOEAL MORPHOLOGY



The third maxilliped has a protopod from which arises a well developed 5-segmented endopod and a narrow 2-segmented exopod. The protopod is usually broad, with the external margin bearing a well developed epipod covered with plumodenticulate and other setae.

The pereopods have seven segments in the majority of the brachyuran megalopae. However, the basial segment is not always clearly differentiated from the ischium. The lower margin of the dactyl on the 5th pereopod (p5) is armed with simple setae in almost all species studied.

The pleopods are attached to the ventral surface of the abdominal somites. Each appendage bears long marginal natatory plumose setae, the number of setae decreasing on succeeding pairs. A small endopod is present which is distally armed with a number of specialized setae that interlock with those of the adjacent pleopod and allow for synchronized movement of the swimming appendages.

General outline classification

The classification of brachyurans of the Southwest Atlantic Ocean is summarized as follows based on Bowman and Abele (1982), Williams (1984), and Melo (1996):

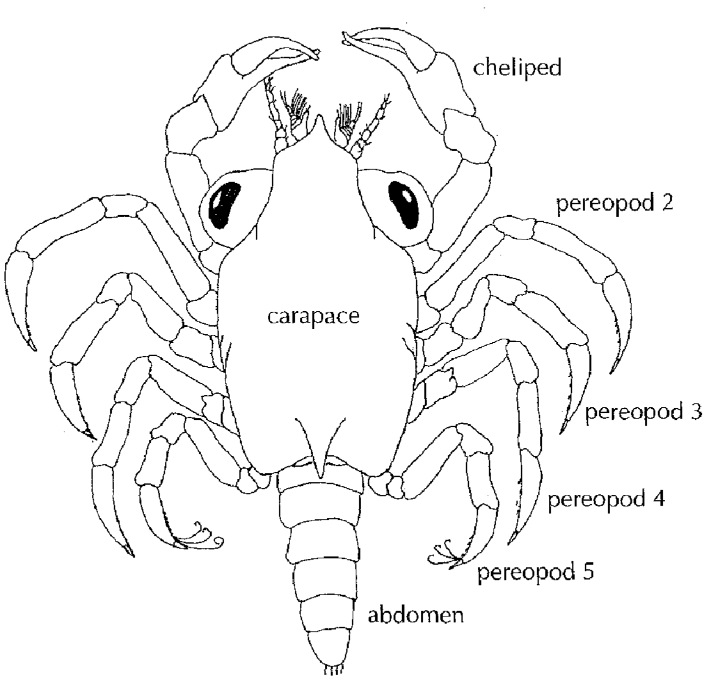
Superclass Crustacea Pennant, 1777
Class Malacostraca Latreille, 1806
Subclass Eumalacostraca Grobben, 1892
  Superorder Eucarida Calman, 1904
  Order Decapoda Latreille, 1803
  Suborder Pleocyemata Burkenroad, 1963
  Infraorder Brachyura Latreille, 1803
  Section Dromiacea De Haan, 1833
    Superfamily Dromioidea De Haan, 1833
      Family Dromiidae De Haan, 1833
    Superfamily Homoloidea De Haan, 1839
      Family Homolidae De Haan, 1839
      Family Latreilliidae Stimpson, 1858
  Section Oxystomata H. Milne Edwards, 1834
    Superfamily Dorippoidea De Haan, 1833
      Family Dorippidae De Haan, 1833
    Superfamily Calappoidea De Haan, 1833
      Family Calappidae De Haan, 1833
      Family Leucosiidae Samouelle, 1819
    Superfamily Cyclodorippoidea Ortmann, 1892
      Family Cyclodorippidae Ortmann, 1892
      Family Cymonomidae Bouvier, 1897
    Superfamily Raninoidea De Haan, 1833
      Family Raninidae De Haan, 1833
  Section Oxyrhyncha Latreille, 1803
    Superfamily Majoidea Samouelle, 1819
      Family Majidae Samouelle, 1819
    Superfamily Parthenopoidea MacLeay, 1838
      Family Parthenopidae MacLeay, 1838
    Superfamily Hymenosomatoidea MacLeay, 1838
      Family Hymenosomatidae MacLeay, 1838
  Section Brachyrhyncha Borradaile, 1907
    Superfamily Cancroidea Latreille, 1803
      Family Atelecyclidae Ortmann, 1893
    Superfamily Bellioidea Dana, 1852
      Family Belliidae Dana, 1852
    Superfamily Portunoidea Rafinesque, 1815
      Family Portunidae Rafinesque, 1815
    Superfamily Xanthoidea MacLeay, 1838
      Family Geryonidae Colosi, 1924
      Family Xanthidae MacLeay, 1838
      Family Goneplacidae MacLeay, 1838
    Superfamily Pinnotheroidea De Haan, 1833
      Family Pinnotheridae De Haan, 1833
    Superfamily Grapsoidea MacLeay, 1838
      Family Grapsidae MacLeay, 1838
      Family Gecarcinidae MacLeay, 1838
    Superfamily Ocypodoidea Rafinesque, 1815
      Family Ocypodidae Rafinesque, 1815
      Family Palicidae Bouvier, 1897
    Superfamily Cryptochiroidea Paulson, 1875
      Family Cryptochiridae Paulson, 1875

Identification

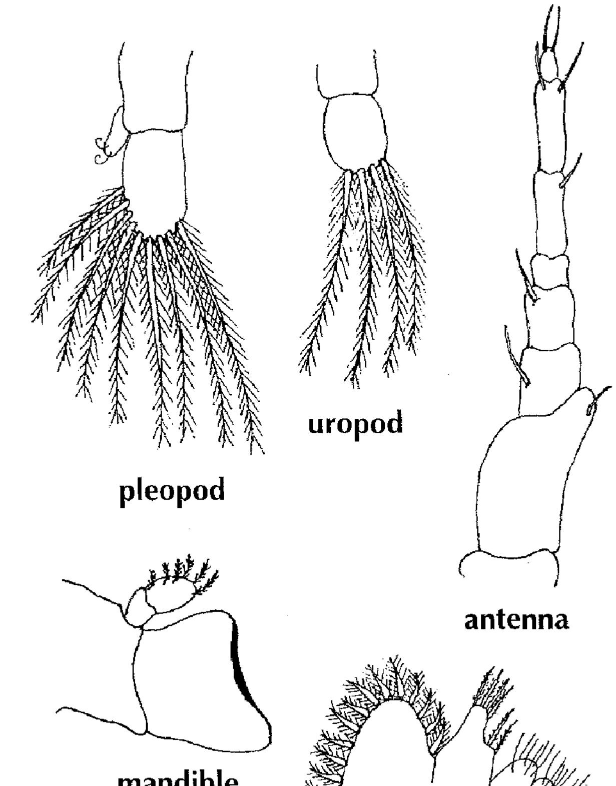
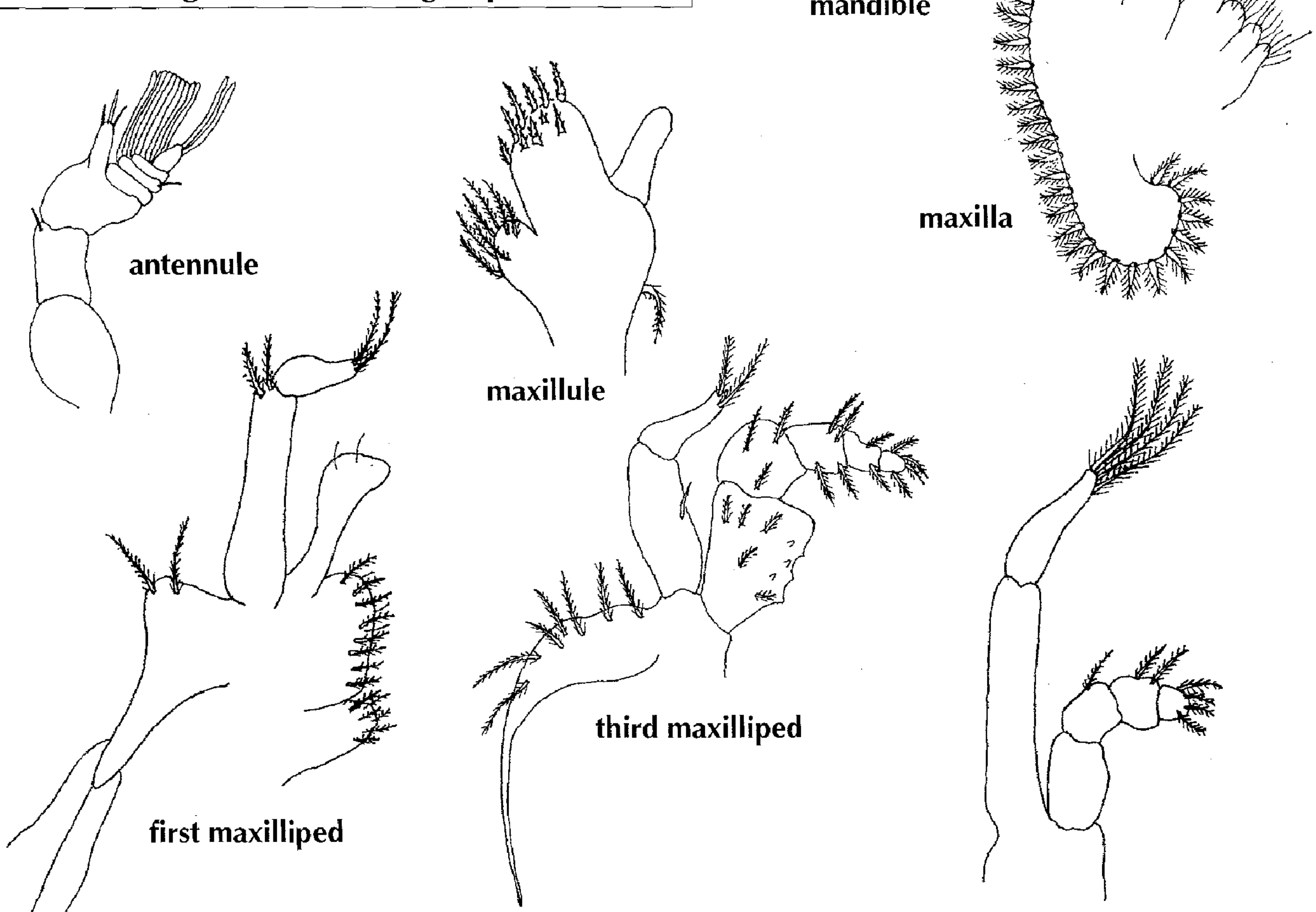
Table 4 summarizes the present knowledge of larval development for families of brachyuran crabs from the Southwest Atlantic Ocean. As mentioned above, it is important for the reader to realize that because of many unknown larvae, those to be identified may not fit any larvae described herein. However, in such cases the keys may help in narrowing the search to higher groups, such as families. It also must be recognized

Fig. 2. Crab zoeal morphology. Original.

CRAB MEGALOPAL MORPHOLOGY



A Dorsal view of generalized megalopa

B Appendages

Section	Family	Number of species	Number of genera	Number of species with known larval development
DROMIACEA	Dromiidae	4	3	4
	Homolidae	2	2	1
	Latreilliidae	2	1	1
OXYSTOMATA	Dorippidae	4	2	1
	Calappidae	12	5	2
	Leucosiidae	20	9	1
	Cyclodorippidae	8	4	0
	Cymonomidae	4	2	0
	Raninidae	5	3	0
OXYRHYNCHA	Majidae	83	45	19
	Parthenopidae	16	8	1
	Hymenosomatidae	1	1	1
BRACHYRHYNCHA	Atelecyclidae	1	1	1
	Belliidae	4	3	3
	Portunidae	24	9	9
	Geryonidae	2	1	0
	Xanthidae	53	26	23
	Goneplacidae	18	13	0
	Pinnotheridae	18	9	9
	Grapsidae	24	15	17
	Gecarcinidae	2	2	1
	Ocypodidae	12	3	7
	Palicidae	7	1	0
	Cryptochiridae	2	2	1
	TOTAL	**328**	**170**	**102**

Table 4. Summary of brachyuran crabs from the Southwest Atlantic and the number of species with known larval development.

Fig. 3. Crab megalopal morphology. Original.

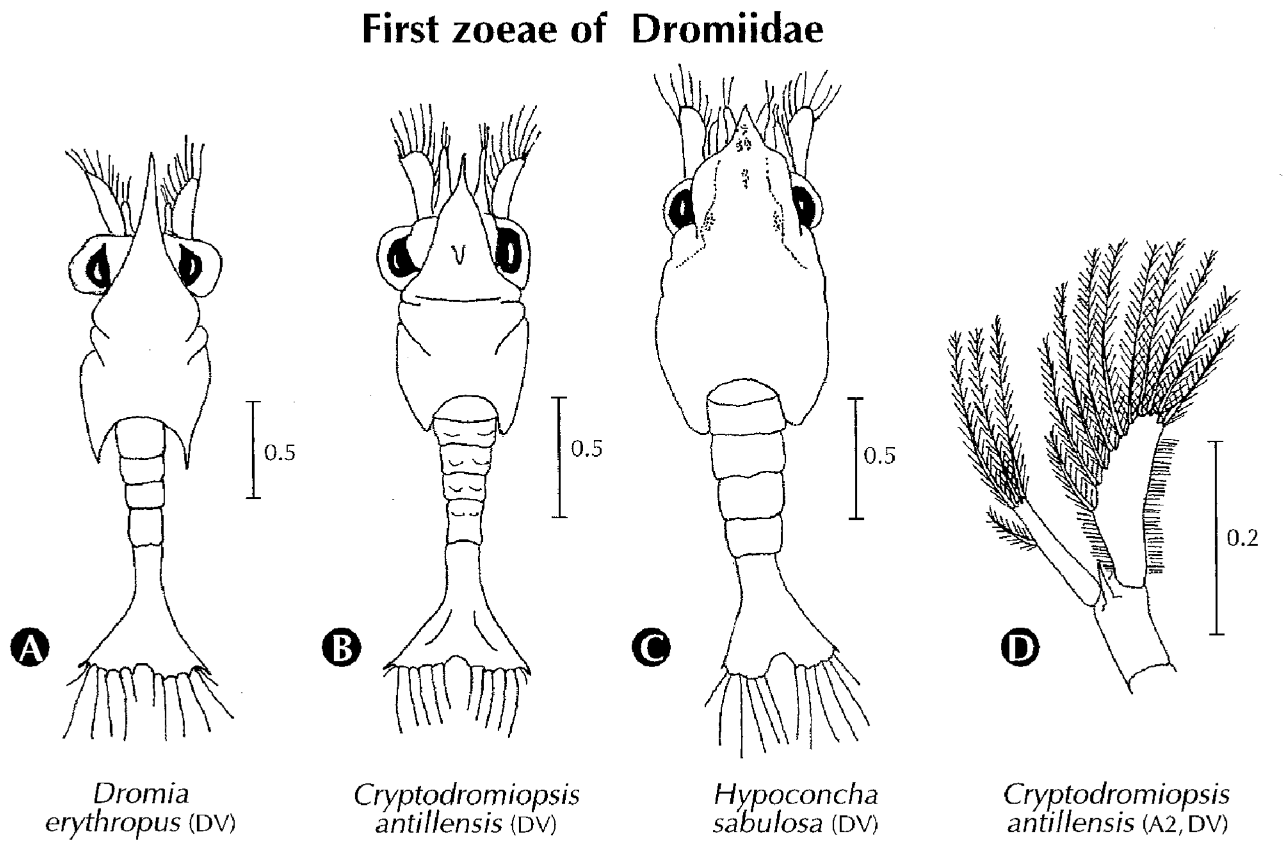


Fig. 4. First zoeae of Dromiidae. A2: antenna; DV: dorsal view; LV: lateral view; scale in mm. Sources, from Lang and Young (1980): C; from Laughlin *et al.* (1982): A; from Rice and Provenzano (1966): B-D.

First zoeae of Dromiidae

Species	Carapace	Abdomen	Antennule	Maxilliped 3 endopod
Cryptodromiopsis antillensis	With blunt dorsal projection, transverse groove and two pairs of lateral grooves	Pair of blunt dorsal projections on somites 2-5	2 aesthetascs	2 plumose setae
Dromia erythropus	No dorsal projection but with spine on each posterolateral corner	No dorsal projections or spines	6 aesthetascs	1 denticulate 1 simple seta
Hypoconcha sabulosa	No spine but one pair of transverse grooves	No spines	3 aesthetascs	2 plumose setae
Hypoconcha arcuata	No spines and no grooves	No spines	5 aesthetascs	no setae

Table 5. Species characters of first zoeae of Dromiidae.

that most of the larval accounts are based on laboratory rearings, and it is still unclear how much variability there is between specimens obtained from the wild and those obtained from culture (Ingle, 1992). Thus definitive identifications should be obtained by consultations with experts in the field.

In order to arrive at an identification, the reader should first use the family key. Larvae are grouped using a minimum of obvious characters to separate families, so that in almost all cases a dissecting microscope is not necessary for rapid identification. Characters given in the appropriate family tables (Tables 5-13) can then be used to further identify a specimen to the species level. Once a larva has been identified, we suggest that this be verified using additional details given in the original literature cited in Table 14.

It should be noted that, for practical purposes, the ordering of families does not exactly follow established groupings of adults.

Identification of crab zoeae: Key to the brachyuran families from the Southwest Atlantic based on the first larval stage

1 Carapace long, horizontally elongated or shrimp-like, telson subtriangular 2
1a Carapace not long or shrimp-like, telson not subtriangular (except Leucosiidae) 4
2 Carapace without dorsal and lateral spines; posterior margin not denticulate; antennal spinous process (protopod) shorter than endopodite: **Dromiidae** (Fig. 4, Table 5)
2a Carapace with dorsal and lateral spines; posterior carapace margin denticulate; antennal protopod longer than endopodite 3
3 Antennal spinous process longer than exopod; abdominal somites with dorsal and lateral spines, telson with dorsal spines: **Homolidae** (Fig. 5)
3a Antennal spinous process shorter than exopod; abdomen lacking dorsal and lateral spines and telson without dorsal spines: **Latreilliidae** (Fig. 6)
4 Carapace spines extremely long, more than twice carapace length; telson very long, exceeding length of abdominal somites, bearing two medial setae on furcal arch and pair of setae laterally on proximal portion of telson: **Dorippidae** (Fig. 7)
4a Carapace spines and telson shorter; telson setation different 5
5 Telson sub-triangular, with short furcal spines and lacking medial arch; antenna rudimental, consisting of single process: **Leucosiidae** (Fig. 8)
5a Telson not sub-triangular, with longer distinct furcal spines and discrete medial arch; antenna more developed, usually consisting of more numerous and/or longer armed processes 6
6 Carapace with rostral, dorsal or lateral spines and conspicuous projection: **Majidae** (in part, Fig. 9, Table 6)

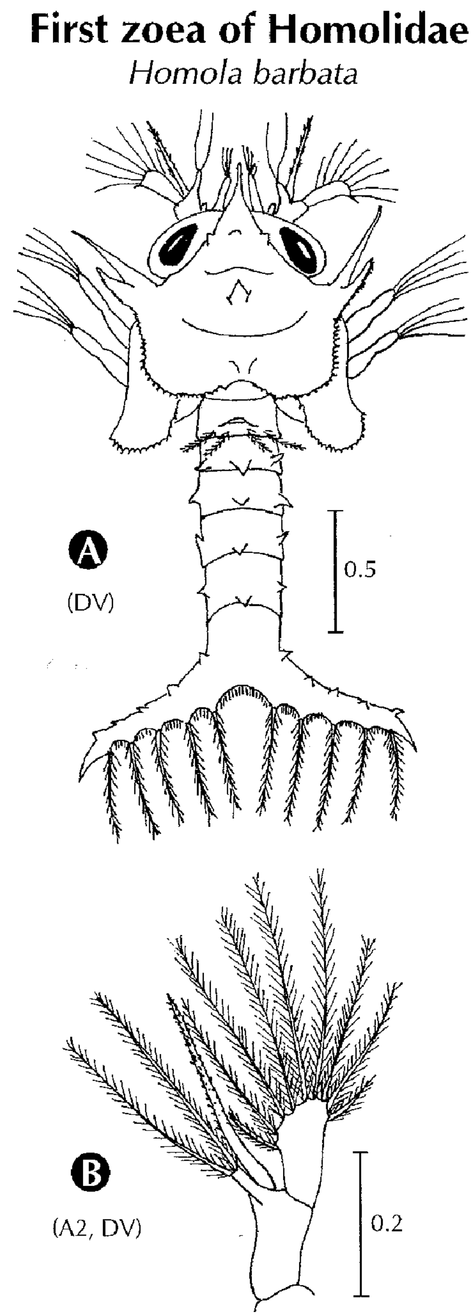


Fig. 5. First zoea of Homolidae. A2: antenna; DV: dorsal view; LV: lateral view; scale in mm. Sources, from Rice and Provenzano (1970): A, B.

6a Carapace usually with the full complement of dorsal, rostral and lateral carapace spines, but without other conspicuous projection 12
6b Carapace lacking some spines...........................7
7 Carapace with all spines missing: **Pinnotheridae** (in part - *Z. ostreum*, Fig. 10; Table 7)
7a Carapace with dorsal and/or lateral spines missing 8

8 Carapace with rostral spine but lacking lateral and dorsal spines; antenna reduced to a protopod process with short proximal seta representing exopod; telson furcae shorter than telson body: **Hymenosomatidae** (Fig. 11)

8a Carapace with rostral and dorsal spines but lacking lateral spines; antenna usually more developed and telson furcae longer 9

9 Rostral and dorsal carapace spines very long, at least 1.5x carapace length: **Belliidae** (Fig. 12, Table 8)

9a Rostral and dorsal carapace spines shorter 10

10 Rostral spine shorter than antenna: **Majidae** (in part, Fig. 9, Table 6)

10a Rostral spine longer than antenna 11

11 Antennal exopodite usually not well developed, less than ½ protopodite length: **Grapsidae** (Fig. 13, Table 9)

11a Antennal exopodite usually well developed, more than ½ protopodite length: **Ocypodidae** (in part, Fig. 14, Table 10)

12 Abdomen laterally and/or posteriorly expanded on some somites 13

12a Abdomen usually with more or less parallel sides and posterolateral spines shorter than somite...16

13 Abdominal somites 3-5 with prominent posterolateral spines, about as long as length of somite; antennal exopod shorter than protopod; telson furcae arched: **Parthenopidae** (Fig. 15)

13a Abdominal somites with shorter posterolateral spines; antennal exopod either as long as spinous process or reduced to a seta; telson furcae parallel 14

14 Antennal exopodite reduced to a seta; abdominal somite 5 laterally expanded into wing-like extension: **Pinnotheridae** (in part- *Pinnixa* spp., Fig. 10, Table 7)

14a Antennal exopodite not reduced to a seta, at least ½ length of spinous process; abdominal somite 5 not laterally expanded into wing-like extension 15

15 Abdominal somite 4 laterally expanded into wing-like extension; antennal exopod about as long as spinous process: **Cryptochiridae** (Fig. 16)

15a Abdominal somites 4 posterolaterally slightly expanded (more so and with rough surface in alter stages); antennal exopod less than ½ length of spinous process: **Ocypodidae** (in part, *Ocypode quadrata*, Fig. 14)

First zoea of Latreilliidae
Latreillia elegans

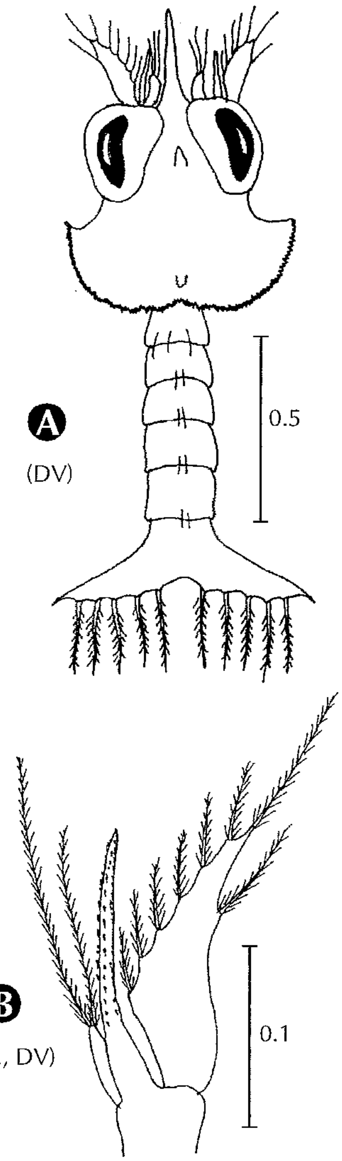


Fig. 6. First zoea of Latreilliidae. A2: antenna; DV: dorsal view; LV: lateral view; scale in mm.
Sources, from Rice and Williamson (1977): A, B (originally fig. 11B, C, D on p. 36).

16 Telson furcae with distinct spines 18

16a Telson without distinct spines 17

17 Antenna with protopod and well developed exopod process, latter about ¾ length of spinous process: **Gecarcinidae** (Fig. 17)

17a Antenna with exopod shorter: **Grapsidae** (in part, Fig. 13)

17b Antenna without exopod: **Pinnotheridae** (in part, Fig. 10, Table 7)

18 Telson usually with two or three spines on each furca 19

18a Telson usually with single spine on each furca: **Xanthidae** (Fig. 18, Table 11)

19 Antennal exopod more than ½ length of protopod: **Atelecyclidae** (Fig. 19)

19a Antennal exopod equal or less than ½ length of protopod: **Calappidae** and **Portunidae** (Fig. 20 and 21, Tables 12 and 13)

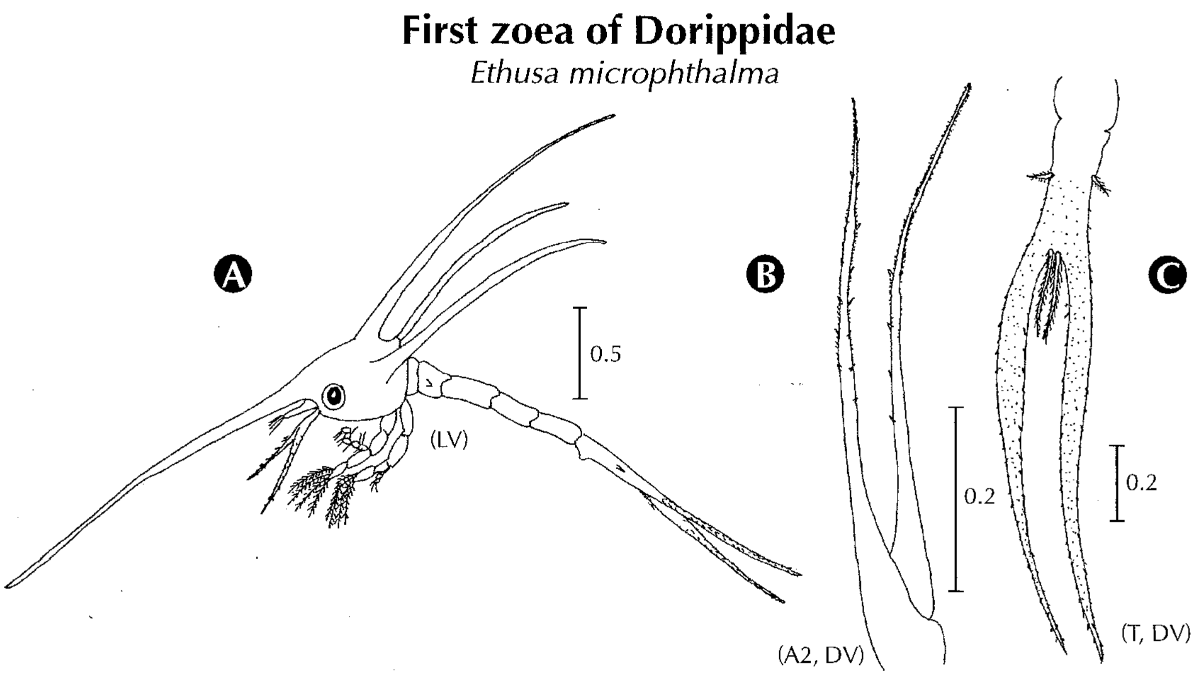


Fig. 7. First zoea of Dorippidae. A2: antenna; DV: dorsal view; LV: lateral view; T: telson; scale in mm. Sources, from Martin and Truesdale (1989): A-C.

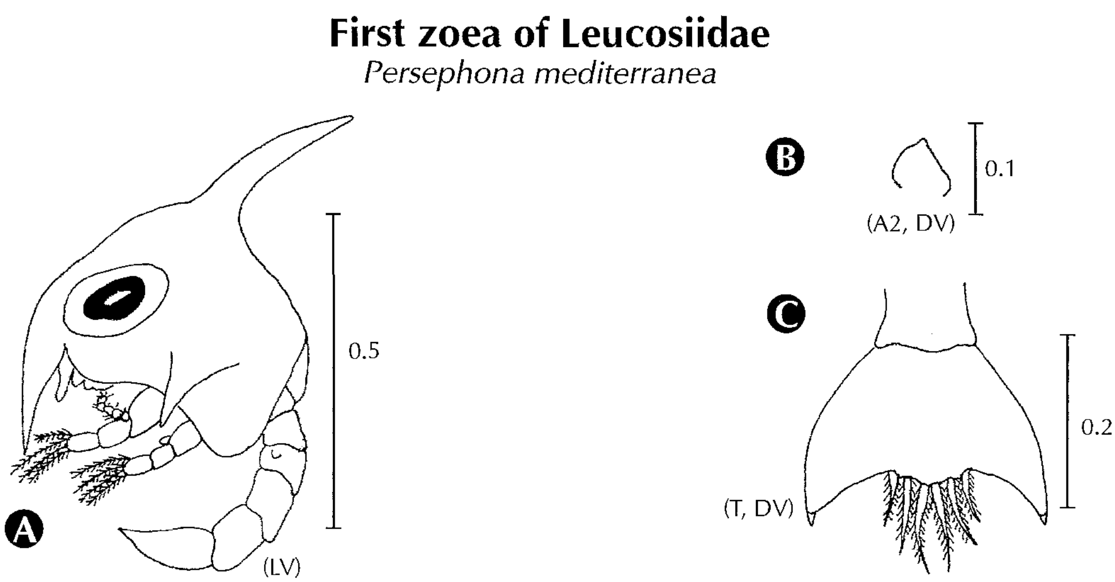
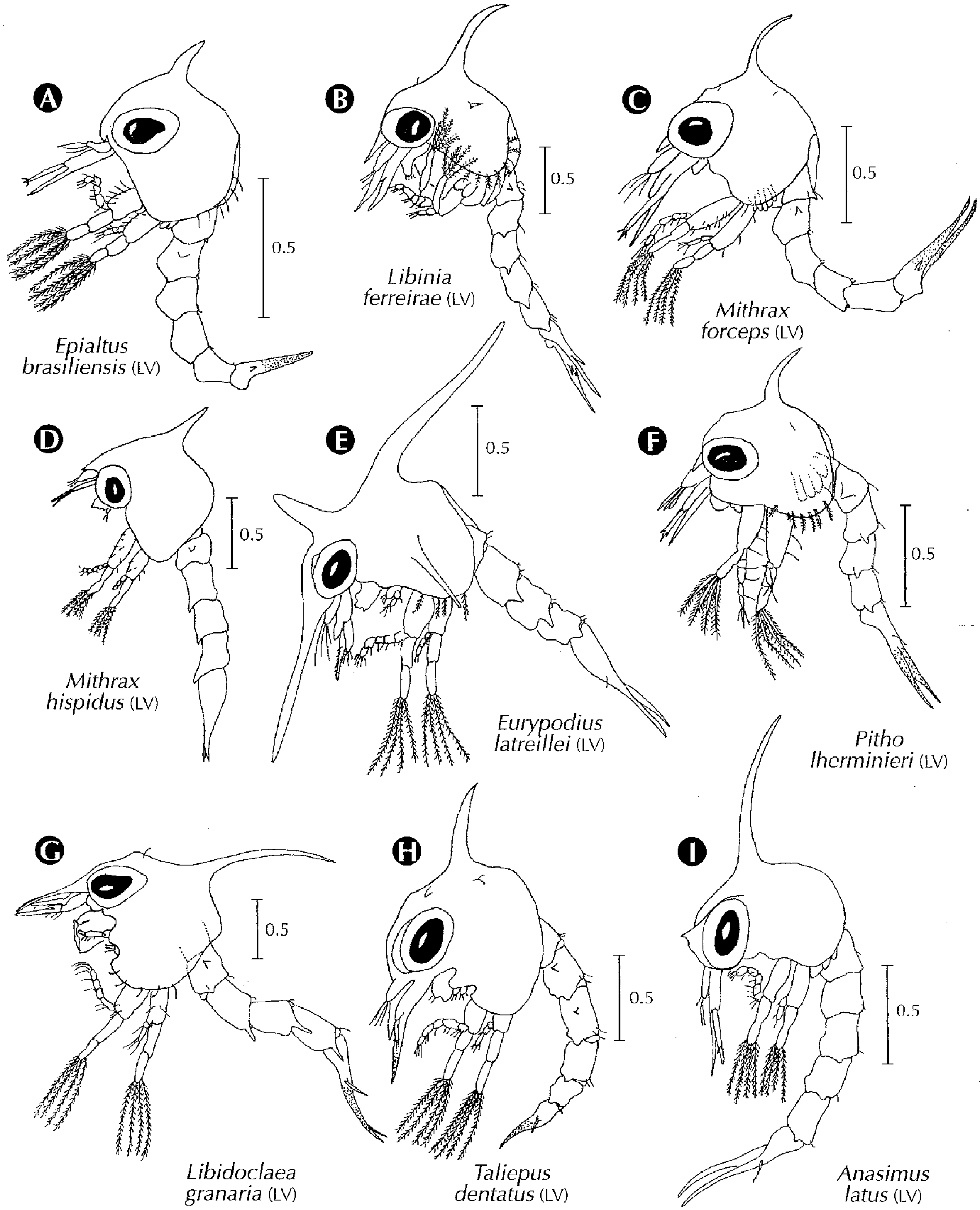


Fig. 8. First zoea of Leucosiidae. A2: antenna; DV: dorsal view; LV: lateral view; T: telson; scale in mm. Sources, from Negreiros-Fransozo *et al.* (1989): A-C.

First zoeae of Majidae



First zoeae of Majidae

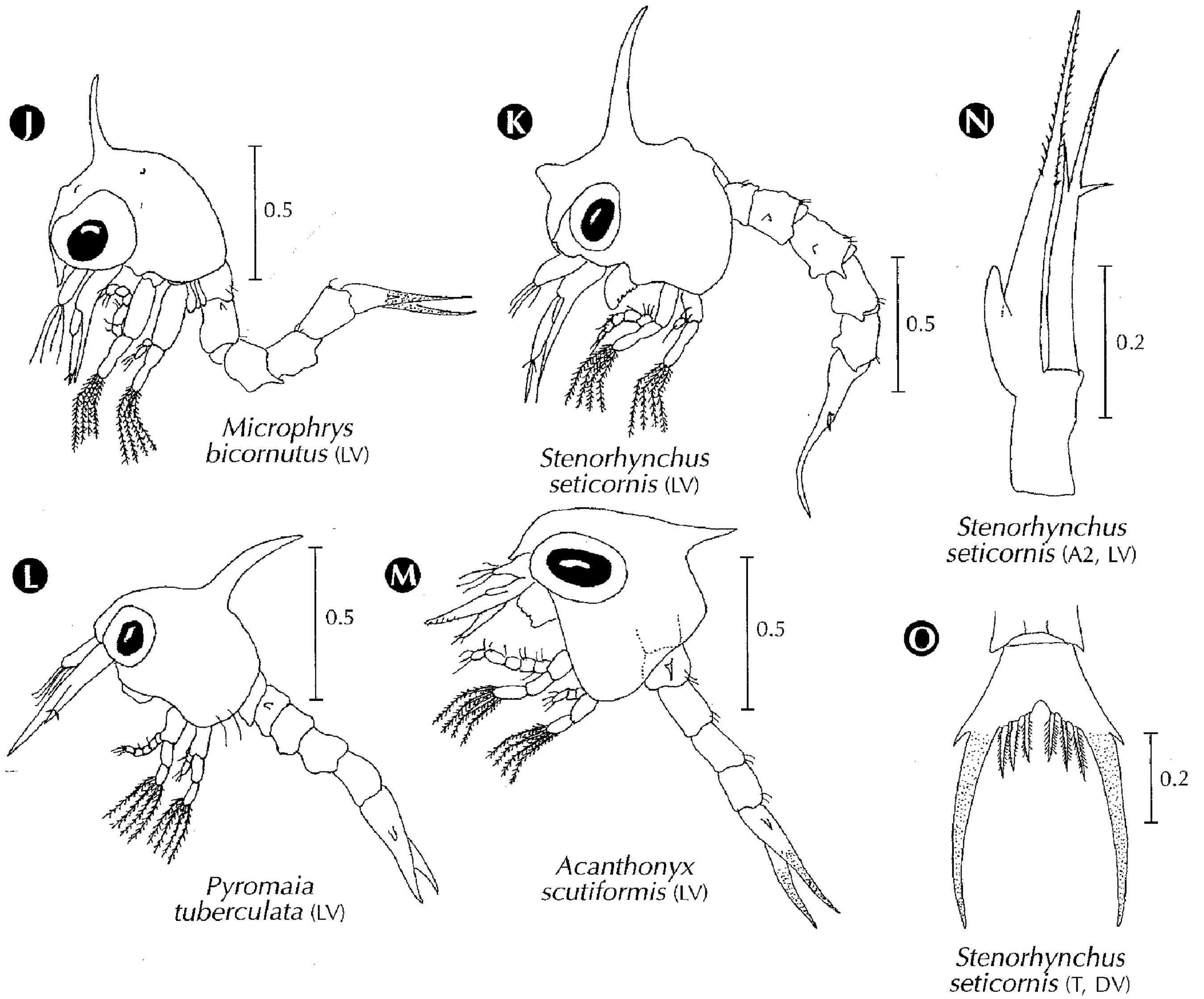


Fig. 9. First zoeae of Majidae. A2: antenna; DV: dorsal view; LV: lateral view; T: telson; scale in mm. Sources, from Bakker *et al.* (1990): B; from Bolaños *et al.* (1996): F; from Campodónico and Guzmán (1972): E; from Fagetti (1969): G; from Fagetti and Campódonico (1971): H; from Fransozo and Hebling (1982): D; from Fransozo and Negreiros-Fransozo (1997): L; from Hartnoll (1964): J; from Hiyodo *et al.* (1994): M; from Negreiros-Fransozo and Fransozo (1991): A; from Sandifer and van Engel (1972): I; from Wilson *et al.* (1979): C; from Yang (1976): K, N, O.

First zoeae of Majidae

Subfamilies/Species	Spines and posterolateral setae on carapace	Dorsolateral projections on abdomen	Posterolateral processes on abdomen	Marginal + apical setae on scaphognathite
INACHINAE				
Eurypodius latreillei	1 rostral, 1 dorsal, 2 laterals, 4 setae	2nd and 3rd somites	3rd and 4th somites	10
Stenorhynchus seticornis	1 dorsal, 3(4) setae	2nd and 3rd somites	3rd and 4th somites	10 + 1
INACHOIDINAE				
Anasimus latus	1 dorsal, several setae	2nd somite	3rd and 4th somites	10 + 1
Pyromaia tuberculata	1 dorsal	2nd somite	absent	10 + 1
TYCHINAE				
Pitho lherminieri	1 rostral, 1 dorsal, 7 setae	2nd and 3rd somites	3rd and 4th somites	26
EPIALTINAE				
Taliepus dentatus	1 rostral, 1 dorsal, 4 setae	2nd somite	absent	10 + 1
Epialtus brasiliensis	1 rostral, 1 dorsal, 4 (5) setae	2nd somite	absent	12 + 1
Acanthonyx scutiformis	1 rostral, 1 dorsal	2nd somite	absent	11 + 1
Epialtus bituberculatus	1 rostral, 1 dorsal, 9 setae	2nd somite	absent	12 + 1
PISINAE				
Libinia spinosa	1 rostral, 1 dorsal	2nd somite	3rd and 4th somites	10
Libidoclaea granaria	1 rostral, 1 dorsal, 5 setae	2nd somite	3rd and 4th somites	14 + 1
Libinia ferreirae	1 rostral, 1 dorsal, 6(7) setae	2nd somite	3rd and 4th somites	10 +1
MITHRACINAE				
Mithraculus forceps	1 rostral, 1 dorsal, 6 setae	2nd somite	3rd and 4th somites	13
Mithraculus coryphe	1 rostral, 1 dorsal, 6 setae	2nd somite	3rd and 4th somites	12 + 1
Mithrax verrucosus	1 rostral, 1 dorsal, 3 setae	2nd somite	3rd and 4th somites	12 + 1
Mithrax caribbaeus	1 rostral, 1 dorsal, 7 setae	2nd somite	3rd and 4th somites	12 + 1
Mithrax hispidus	1 rostral, 1 dorsal, 6 setae	2nd somite	3rd and 4th somites	13
Microphrys bicornutus	1 rostral, 1 dorsal, 6 setae	2nd somite	3rd and 4th somites	12 (13) + 1

Table 6. Species characters of first zoeae of Majidae.

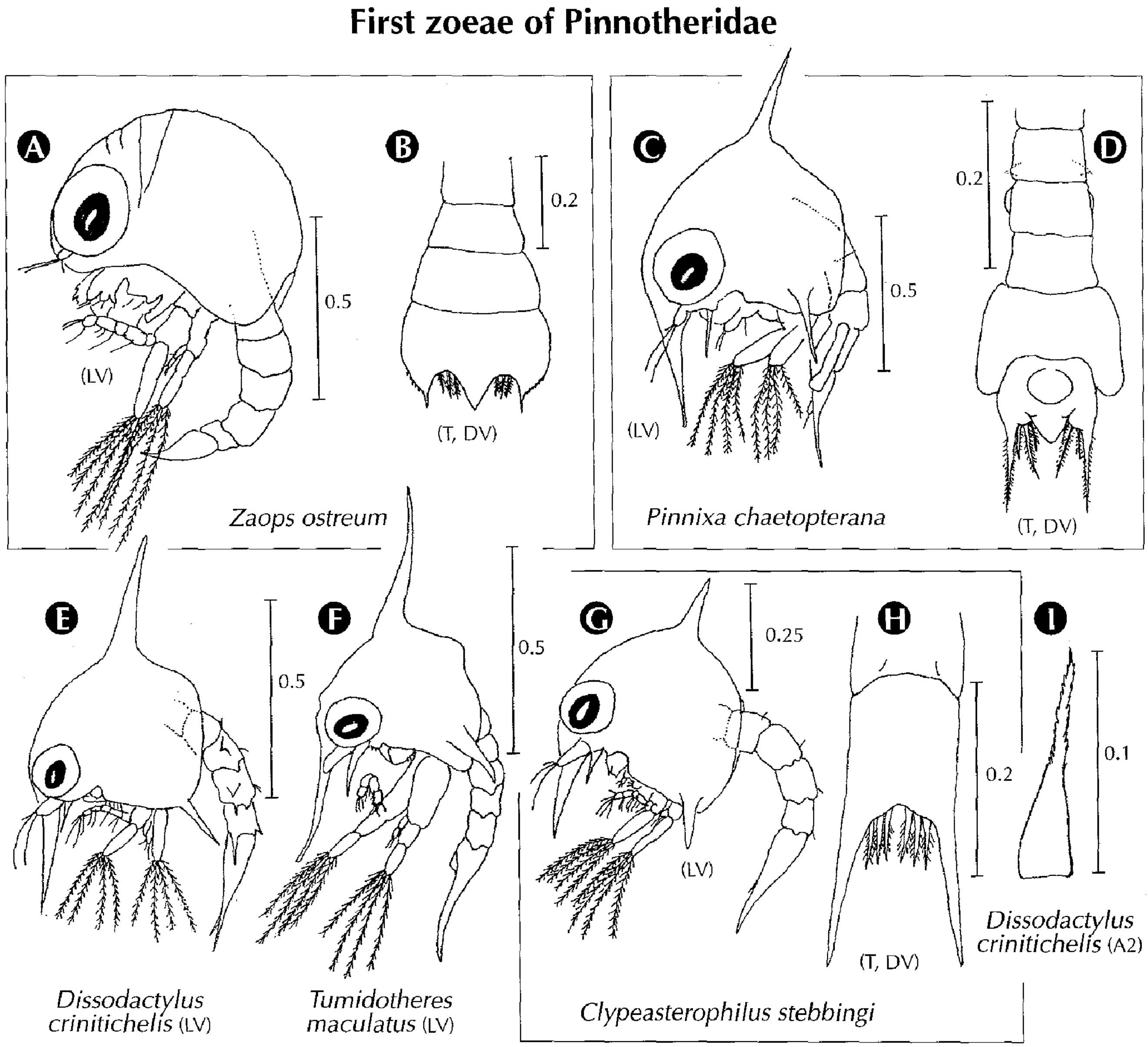


Fig. 10. First zoeae of Pinnotheridae. A2: antenna; DV: dorsal view; LV: lateral view; T: telson; scale in mm. Sources, from Costlow and Bookhout (1966b): F; from Dowds (1980): C, D; from Hyman (1925): A, B; from Marques and Pohle (1996b): G, H; from Pohle and Telford (1981): E, I.

Species	Carapace	Dorso-lateral knobs	Telson	Antenna
Clypeasterophilus stebbingi	all spines present; knobs absent; D<1.5 x R	only on 2nd	furcae spinulose	limited to spinous process
Dissodactylus crinitichelis	all spines present; knobs absent; D<1.5 x R	2nd and 3rd	furcae spinulose	limited to spinous process
Pinnaxodes chilensis	all spines present; knobs absent; D≥1.5 x R	2nd and 3rd	furcae spinulose	limited to spinous process
Pinnixa chaetopterana	all spines present; knobs absent; D<1.5 x R	2nd and 3rd	median notch	limited to spinous process + 1 seta
Pinnixa cristata	all spines present; knobs absent; D<1.5 x R;	2nd and 3rd	median notch	limited to spinous process + 1 seta
Pinnixa patagoniensis	all spines present; knobs absent; D<1.5 x R;	2nd and 3rd	median notch	limited to spinous process + 1 seta
Pinnixa sayana	all spines present; knobs absent; D<1.5 x R	2nd and 3rd	furcae spinulose	limited to spinous process + 1 seta
Tumidotheres maculatus	all spines present; knobs present; D<1.5 x R	2nd and 3rd	furcae spinulose	limited to spinous process
Zaops ostreum	spines absent; knobs absent	no spines	median notch	rudimentary

Table 7. Species characters of first zoeal stage Pinnotheridae (D: dorsal spine; R: rostral spine; CL: carapace length).

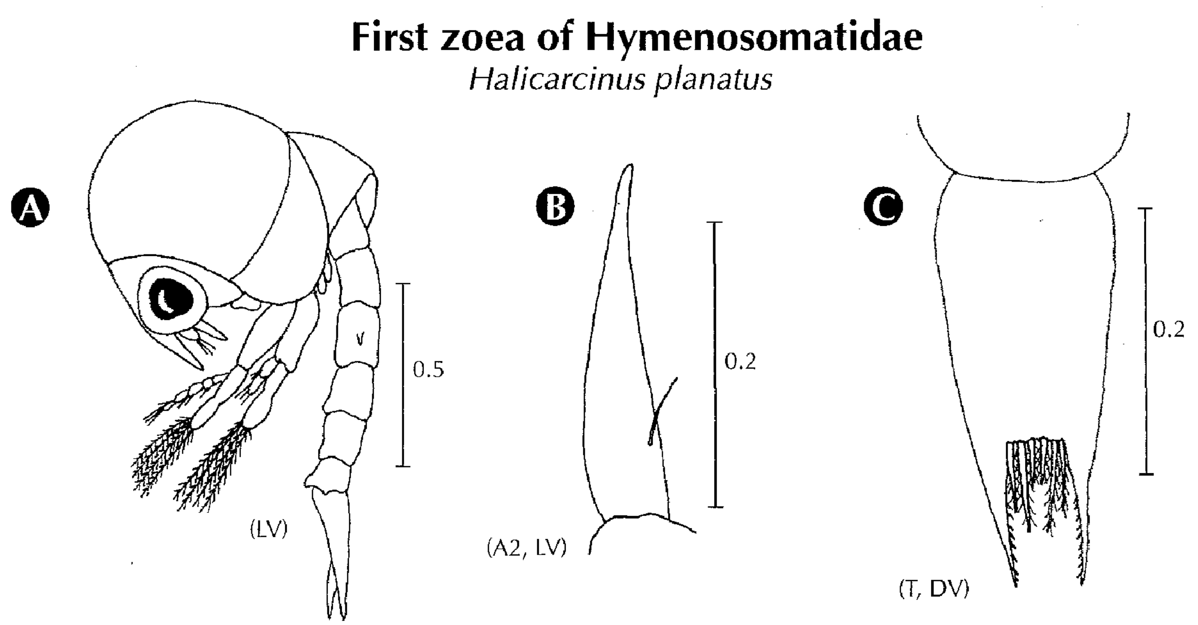


Fig. 11. First zoea of Hymenosomatidae. A2: antenna; DV: dorsal view; LV: lateral view; T: telson; scale in mm. Sources, from Boschi *et al.* (1969): A-C.

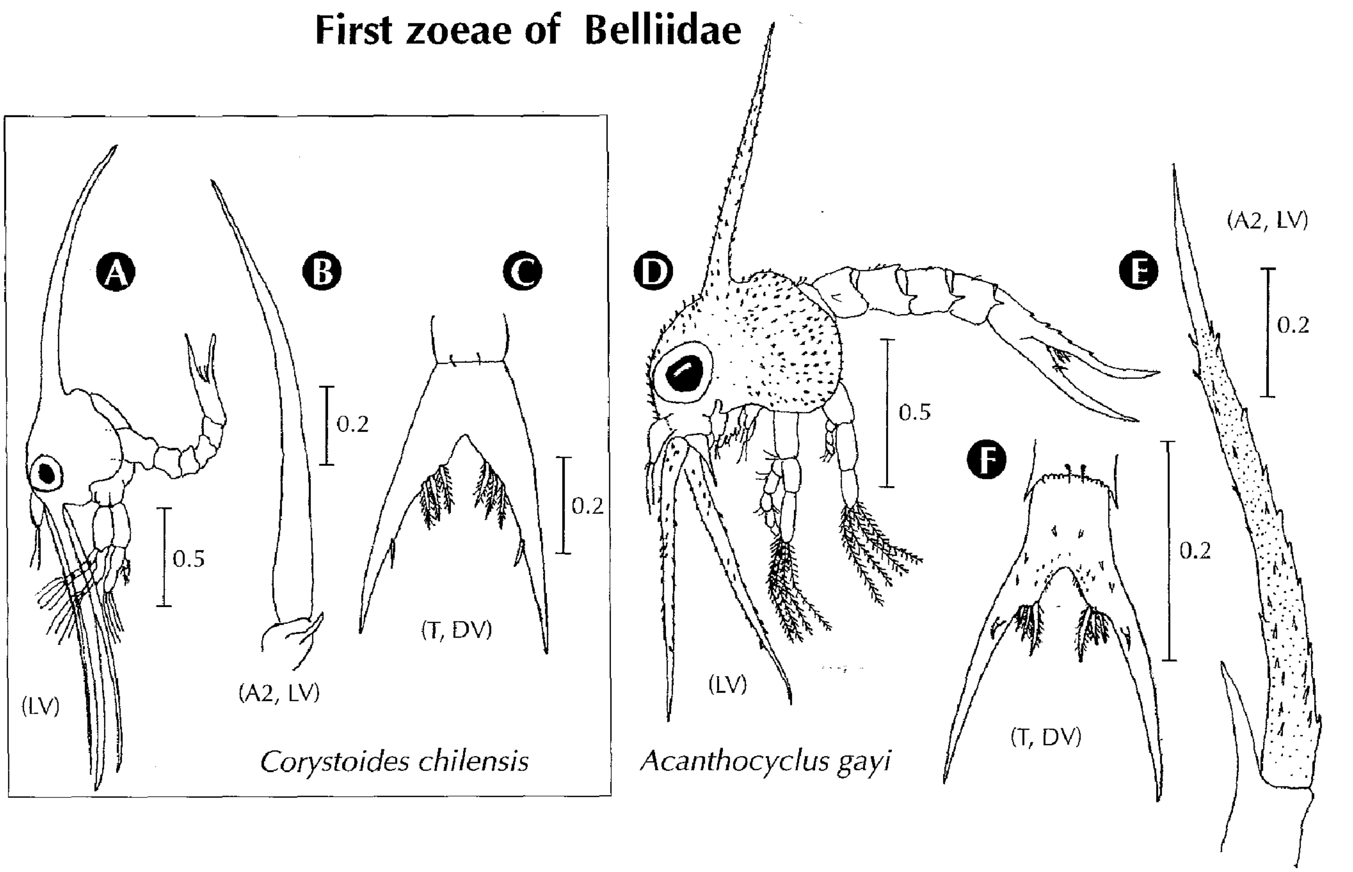


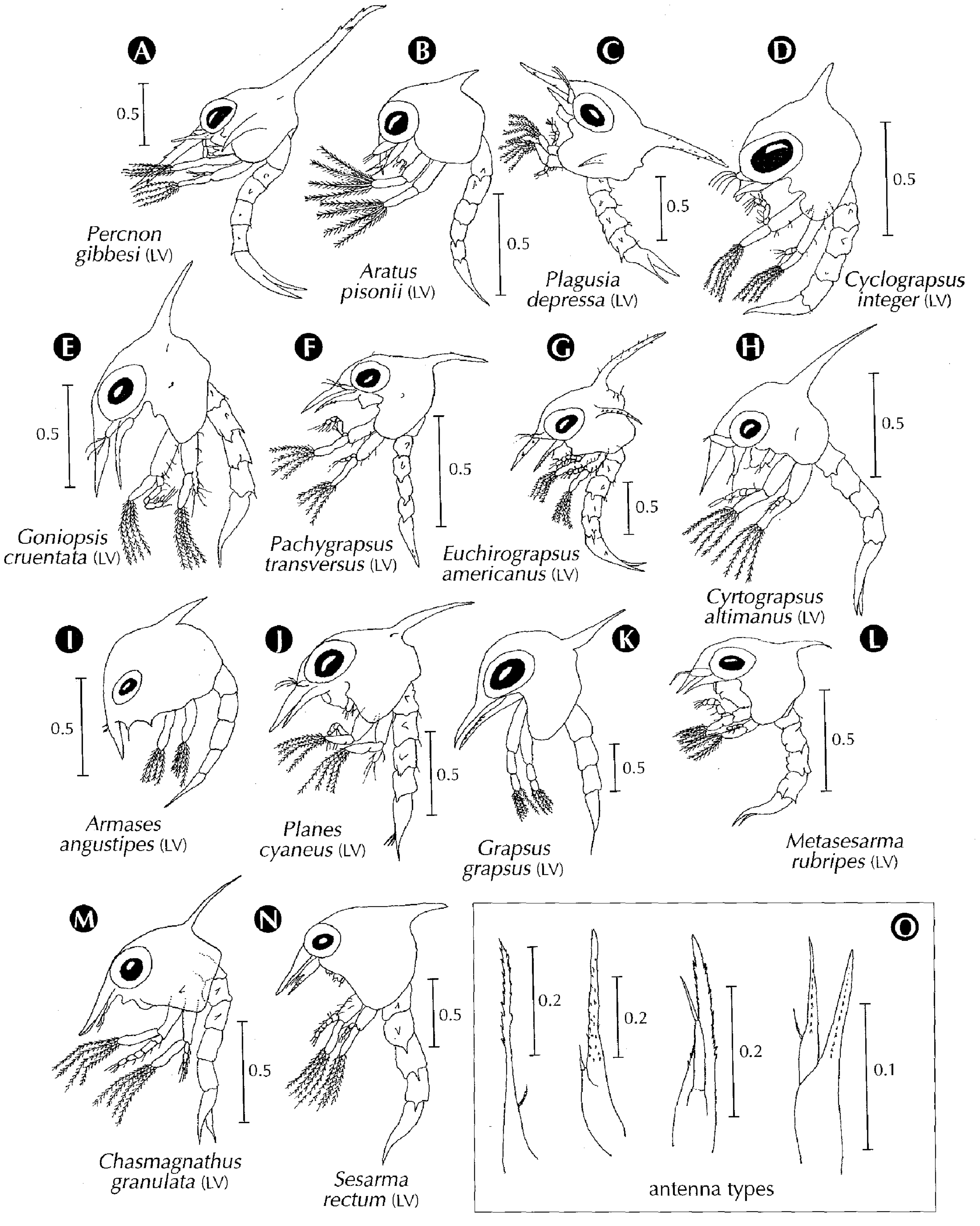
Fig. 12. First zoeae of Belliidae. A2: antenna; DV: dorsal view; LV: lateral view; T: telson; scale in mm. Sources, from Boschi and Scelzo (1970): A-C; from Fagetti and Campodónico (1970): D-F.

First zoeae of Belliidae

Species	Carapace	posterodorsal border of 2nd - 5th abominal somite
Acanthocyclus albatrossis	with spinules only on rostral and dorsal spines	with minute spines + 2 setae
Acanthocyclus gayi	with spinules on spines and all over carapace	with minute spines + 2 setae
Corystoides chilensis	with spinules only on rostral and dorsal spines	2 setae only

Table 8. Species characters of first zoeae of Belliidae.

First zoeae of Grapsidae



Zoeae of Grapsidae

Subfamilies/Species	Antennal endopod length in relation to protopod	Carapace lateral spines	Maxilla endopod setation	Maxilliped 1 basipod setation	Maxilliped 1 endopod setation
GRAPSINAE					
Goniopsis cruentata	rudimentary	knob-like	2, 2	2, 2, 2, 2	1, 2, 1, 2, 5
Grapsus grapsus	half	absent	2, 3	1	1
Pachygrapsus gracilis	rudimentary	absent	2, 2	2, 2, 2, 2	1, 2, 1, 2, 5
Pachygrapsus transversus	rudimentary	knob-like	2, 2	2, 2, 2, 2	1, 2, 1, 2, 5
Planes cyaneus	rudimentary	absent	2, 2	2, 2, 2, 2	1, 2, 1, 2, 5
Geograpsus lividus	rudimentary	absent	2, 2	2, 2, 2, 2	1, 2, 1, 2, 5
SESARMINAE					
Aratus pisonii	half	absent	2, 3	2, 2, 3, 3	2, 2, 1, 2, 5
Chasmagnathus granulata	half	present	2, 2	2, 2, 2, 2	1, 2, 1, 2, 5
Cyclograpsus integer	equal	absent	2, 2	2, 2, 3, 2	2, 2, 1, 2, 5
Metasesarma rubripes	half	absent	2, 3	2, 2, 3, 3	2, 2, 1, 2, 5
Sesarma rectum	half	absent	2, 3	2, 2, 3, 3	2, 2, 1, 2, 5
Armases (= Sesarma) angustipes	half	absent	2, 3	2, 2, 3, 3	2, 2, 1, 2, 5
VARUNINAE					
Cyrtograpsus altimanus	half	present	2, 2	2, 2, 3, 3	2, 2, 1, 2, 5
Euchirograpsus americanus	rudimentary	present	2, 3	2, 2, 2, 2	2, 2, 1, 2, 5
Cyrtograpsus angulatus	half	present	2, 2	2, 2, 3, 3	2, 2, 1, 2, 5
PLAGUSIINAE					
Plagusia depressa	rudimentary	present	2, 2	2, 2, 2, 2	2, 2, 1, 2, 5
Percnon gibbesi	rudimentary	present	2, 2	2, 2, 3, 2	2, 2, 1, 2, 5

Table 9. Species characters of zoeae of Grapsidae.

Fig. 13. First zoeae of Grapsidae. LV: lateral view; scale in mm.
Sources, from Boschi *et al.* (1967): M, O (part); from Cuesta and Rodríguez (1994): F; from Díaz and Ewald (1968): L (originally fig. 1 on p. 226); from Fransozo and Hebling (1986): N; from Fransozo *et al.* (in press): E; from Gore and Scotto (1982): D, O (part); from Gore *et al.* (1982): O (part); from Konishi and Minagawa (1990): J; from Kowalczuk (1994): I; from Lewis (1960): K; from Paula and Hartnoll (1989): A, O (part); from Warner (1968): B; from Wilson (1980): G, O (part); from Wilson and Gore (1980): C.

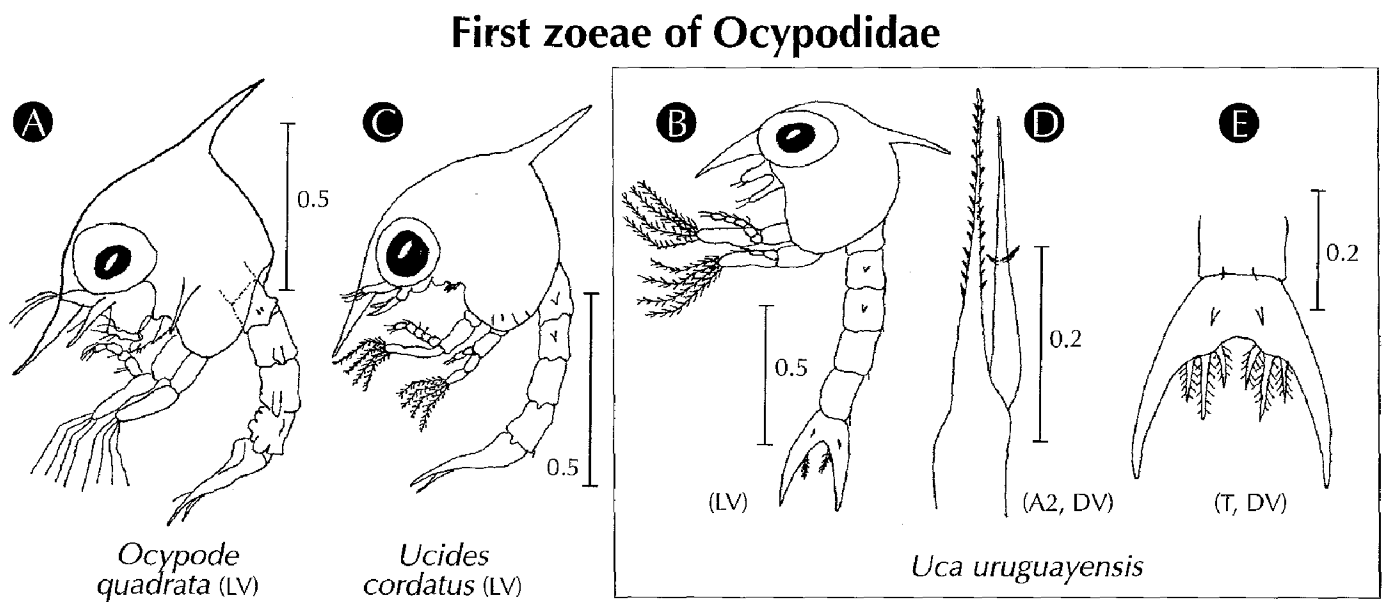


Fig. 14. First zoeae of Ocypodidae. A2: antenna; DV: dorsal view; LV: lateral view; T: telson; scale in mm. Sources, from Díaz and Costlow (1972): A; from Rieger (1996): B, D-E; from Rodrigues and Hebling (1989): C.

Zoeae of Ocypodidae

Genera	Lateral spine on carapace	Antennal exopod setation
Ocypode	present	2 setae
Ucides	absent	2 setae
Uca	absent	3 setae

Uca species	Antennule setation	Maxillule protopod setation	Maxilliped 1 endopod setation	Number of abdominal dorsal setae
U. uruguayensis	2(3) aesthetascs + 1(2) setae	1 seta	2, 2, 1, 2, 5	1, 2, 2, 2, 2
U. vocator	2 aesthetascs + 1(2) setae	no seta	2, 2, 1, 2, 5	0, 2, 2, 2, 2
U. mordax	2(3) aesthetascs + 1(2) setae	no seta	2, 2, 1, 2, 5	0, 2, 2, 2, 2
U. burgersi	2(3) aesthetascs + 1 seta	no seta	2, 2, 1, 2, 5	0, 2, 2, 2, 2
U. thayeri	2 aesthetascs + 1 seta	no seta	0, 1, 1, 1, 4	0, 2, 2, 2, 2

Table 10. Generic and species characters of zoeae of Ocypodidae.

First zoea of Parthenopidae

Parthenope (Platylambrus) serrata

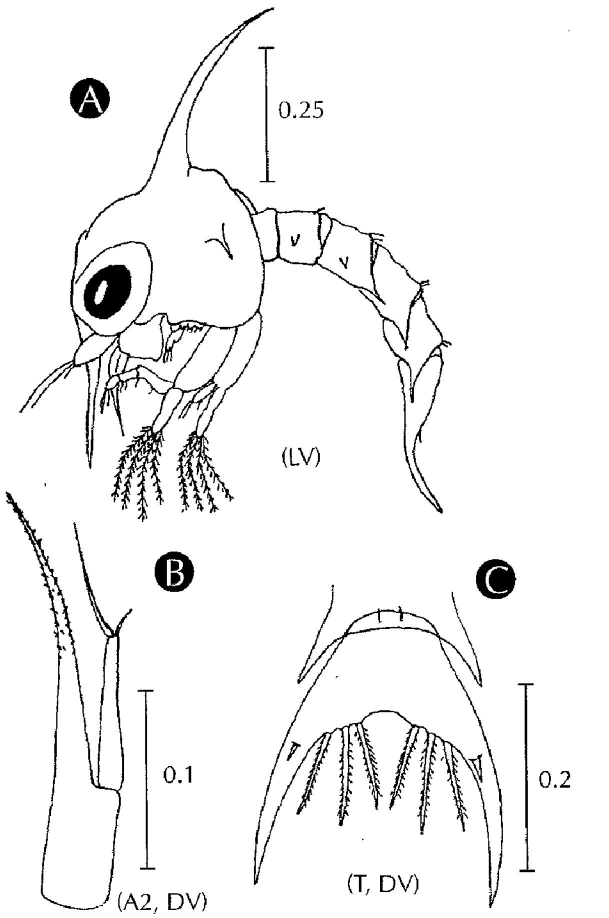


Fig. 15. First zoea of Parthenopidae. A2: antenna; DV: dorsal view; **LV**: lateral view; T: telson; scale in mm. Sources, from Yang (1971): **A-C**.

First zoea of Cryptochiridae

Troglocarcinus corallicola

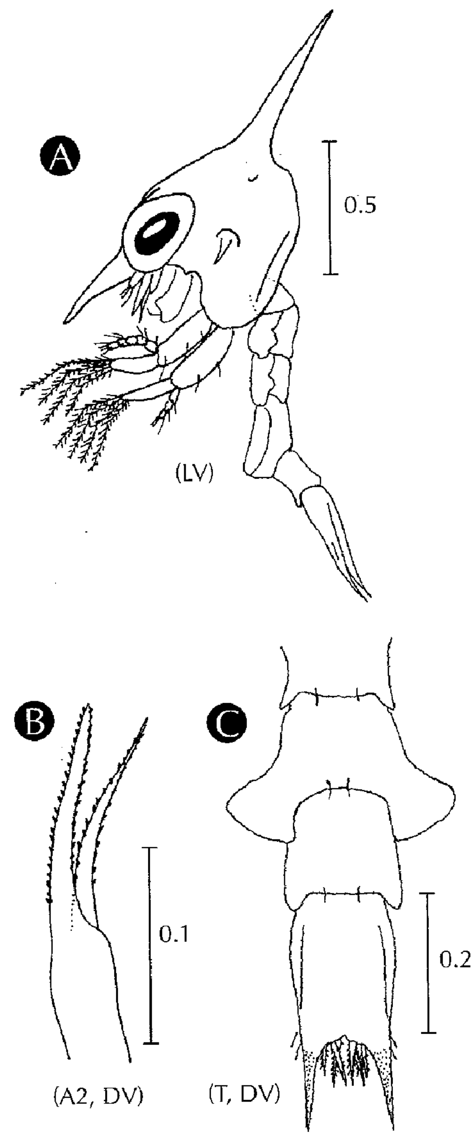


Fig. 16. First zoea of Cryptochiridae. A2: antenna; DV: dorsal view; LV: lateral view; T: telson; scale in mm. Sources, from Scotto and Gore (1981): A-C.

First zoea of Gecarcinidae
Cardisoma guanhumi

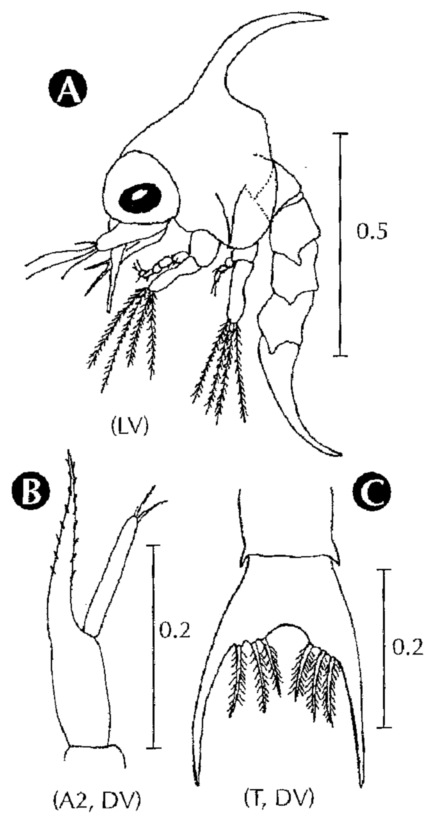
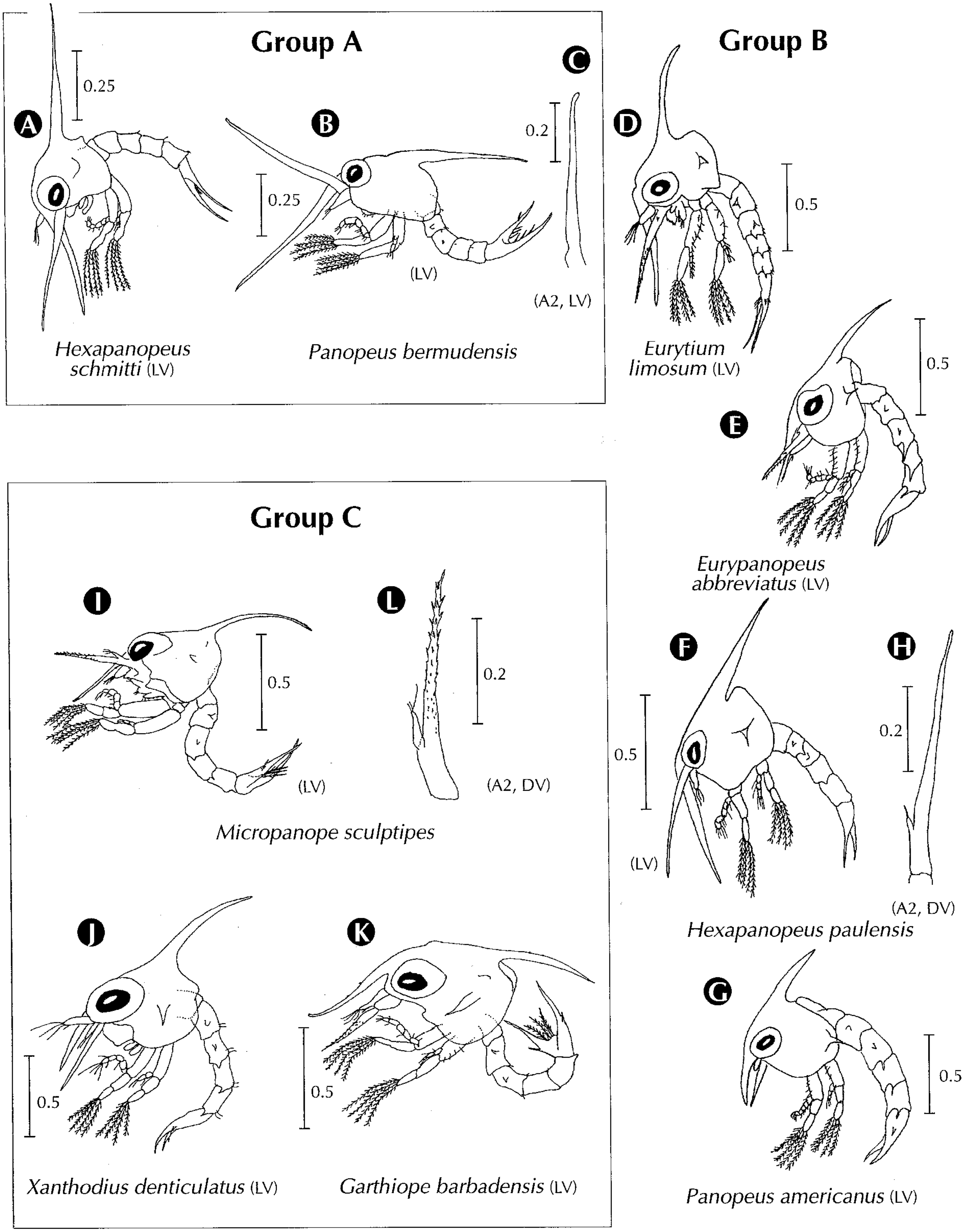


Fig. 17. First zoea of Gecarcinidae. A2: antenna; DV: dorsal view; LV: lateral view; T: telson; scale in mm. Sources, from Costlow and Bookhout (1968): A-C.

First zoeae of Xanthidae



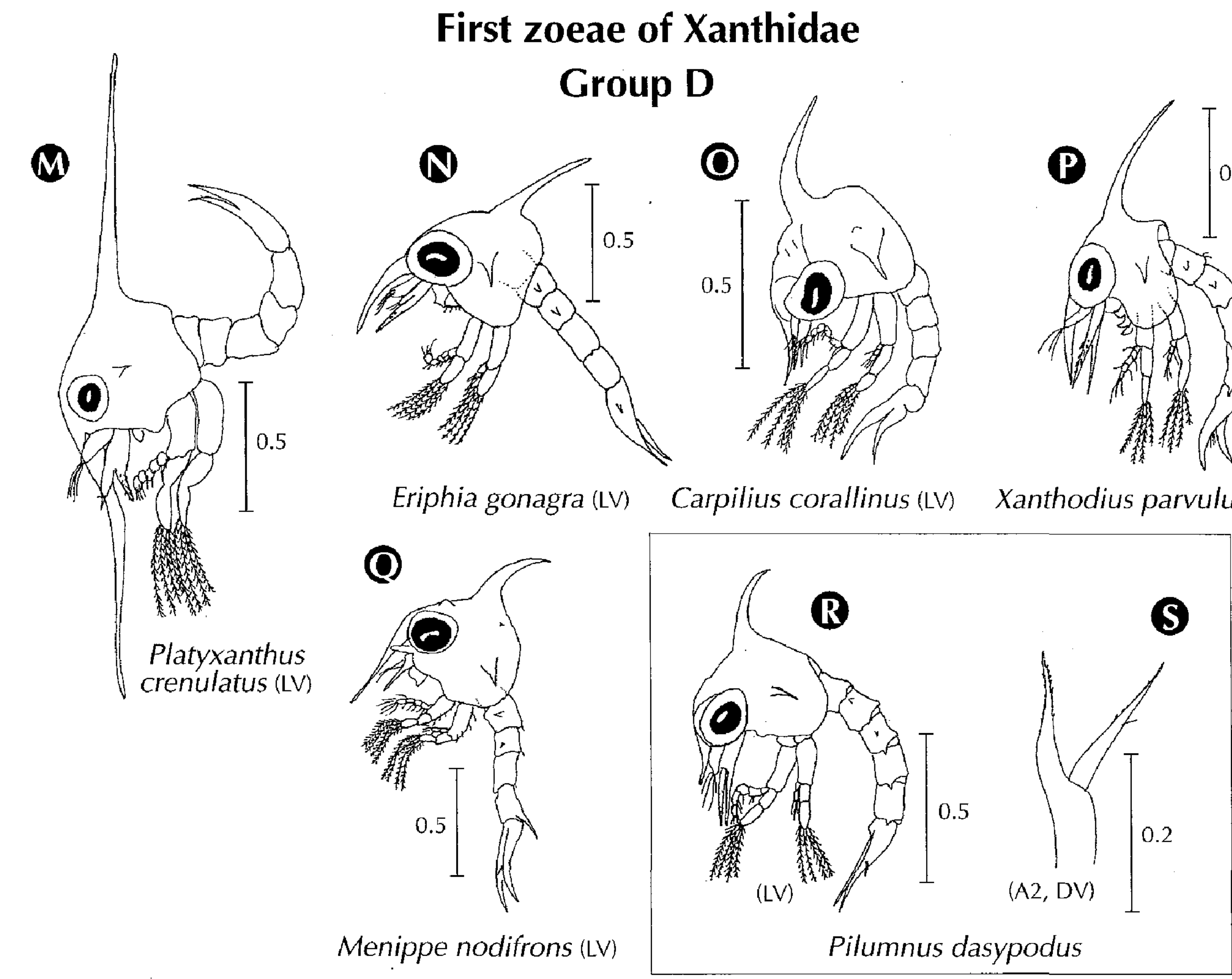


Fig. 18. Zoeae of Xanthidae. A2: antenna; DV: dorsal view; LV: lateral view; scale in mm. Sources, from Andryszak and Gore (1981): I, L; from Bakker *et al.* (1989): A; from Bookhout and Costlow (1979): S; from Fransozo (1987): N; from Fransozo *et al.* (1989): F, H; from Gore *et al.* (1981): K; from Kurata *et al.* (1981): D; from Laughlin *et al.* (1983): O; from Lebour (1944): J, P; from Martin *et al.* (1985): B, C; from Menú-Marque (1970): M; from Negreiros-Fransozo (1986a): E; from Negreiros-Fransozo (1986b): G; from Sandifer (1974): R; from Scotto (1979): Q.

Zoeae of Xanthidae

SPECIES	Medio-dorsal knob on carapace	Lateral spines on carapace	Sharp abdominal postero-lateral process	Antennule setation: aesthetascs + setae	Antenna type (see Fig. 18)	Maxillule endopod setation	Maxillule scaphognatite setation: plumose setae	Maxillliped 1 basis + endopod setation	Maxillliped 2 basis + endopod setation	Telson furcal surface	Telson furcae: dorsal, outer and inner spines
Panopeus herbstii	absent	present	somites 3-5	3 + 2	b	1, 6	4	?; 3, 2, 1, 2, 5	?; 1, 1, 5	smooth	1, 2, 0
Panopeus bermudensis	absent	absent	absent	3(4) + 0	a	1, 6	4	9; 3, 2, 1, 2, 4	3; 1, 1, 3	smooth	1, 0, 0
Panopeus occidentalis	present	present	somites 3-5	3 + 1	b	1, 6	3	10; 3, 2, 1, 2, 5	4; 1, 1, 5	spinulose	1, 2, 0
Panopeus americanus	absent	present	somites 3-5	3 + 1	b	1, 6	4	10; 3, 2, 1, 2, 5	4; 1, 1, 5	smooth	1, 1, 0
Panopeus austrobesus	present in later zoeae	present	somites 3-5	3 + 1	b	1, 6	4	10; 2, 2, 1, 2, 5	4; 1, 1, 4	smooth	1, 2, 0
Hexapanopeus paulensis	absent	present	absent	3 + 1	b	1, 6	4	10; 3, 2, 1, 2, 5	4; 1, 1, 5	smooth	0, 0, 0
Hexapanopeus angustifrons	present	present	absent	4 + 1	b	1, 6	4	4?; 3, 2, 1, 2, 5	3?; 1, 1, 5	smooth	0, 0, 0
Hexapanopeus caribbaeus	absent	present	somite 5	2 + 2	a	1, 6	4	10; 3, 2, 1, 2, 5	4; 1, 1, 5	smooth	1, 0, 0
Hexapanopeus schmitti	absent	present as a protuberance	absent	2 + 1	a	1, 5	4	10; 3, 2, 1, 2, 5	2; 1, 0, 4	smooth	0, 1, 1
Eurypanopeus abbreviatus	present only in zoea 3-4	present	somites 3-5	2 + 1	b	1, 6	4	9; 3, 2, 1, 2, 5	4; 1, 1, 4	smooth	1, 2, 0
Eurypanopeus depressus	only zoea 4	present	somites 3-5	2 + 1	b	1, 6	5	8; 3, 2, 1, 2, 5	4; 1, 1, 5	smooth	1, 0, 0
Pilumnus dasypodus	present	present	absent	2 + 2	c	1, 6	4	10; 3, 2, 1, 2, 5	4; 1, 1, 6	spinulose	1, 2, 0
Eriphia gonagra	absent	present	absent	3 + 0	c	1, 6	4	10; 2, 2, 1, 2, 5	4; 1, 1, 6	smooth	1, 2, 0
Menippe nodifrons	present	present	somite 5	3 + 1	d	1, 4	4	10; 3, 2, 1, 2, 5	4; 0, 1, 4	smooth	1, 2, 0
Eurytium limosum	present	present	absent	2 + 3	b	1, 6	?	?; 3, 2, 1, 2, 5	?; ?	smooth	1, 2, 0
Carpilius corallinus	present	present	absent	2 +1	d	1, 6	4	8; 2, 2, 1, 2, 5	?; 1, 1, 4	?	0, 2, 0
Cataleptodius floridanus	absent	present	absent	3 +1	b	1, 5	4	10; 3, 2, 1, 2, 5	4; 1, 1, 5	spinulose	1, 2, 0
Garthiope barbadensis	present	present	absent	2 + 2	c	1, 6	4	10; 2, 2, 1, 2, 5	4; 1, 1, 5	smooth	1, 2, 0
Micropanope sculptipes	present	present	somites 3-5	3 + 2	c	1, 6	4	10; 2, 2, 1, 2, 5	4; 1, 1, 5	smooth	1, 1, 0
Platyxanthus crenulatus	absent	present	absent	2 + 2	d	1, 6	4	8; 3, 2, 2, 1, 4	4; 1, 1, 5	smooth	1, 0, 0
Platyxanthus patagonicus	present	present	somites 3-5	2 + 2	d	1, 6	4	10; 3, 2, 1, 2, 5	4; 1, 1, 6	smooth	1, 2, 0
Xanthodius denticulatus	absent	present	somites 3-5	?	c	?	?	?	?; ?	smooth	1, 2, 0
Xanthodius parvulus	absent	present	absent	?	d	?	?	?	?; ?	smooth	1, 2, 0

Table 11. Species characters of zoeae of Xanthidae.

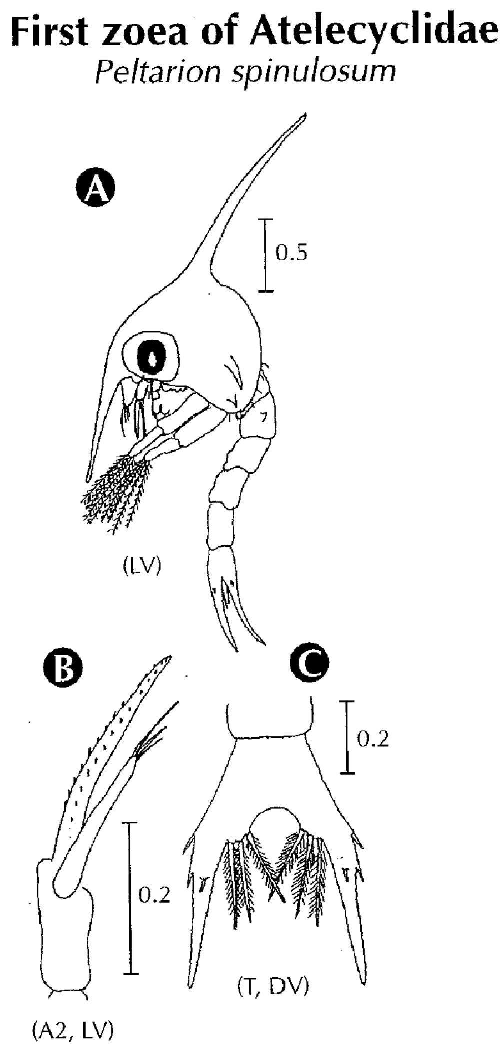


Fig. 19. First zoea of Atelecyclidae. A2: antenna; DV: dorsal view; LV: lateral view; T: telson; scale in mm. Sources, from Iorio (1983): A-C.

First zoeae of Calappidae

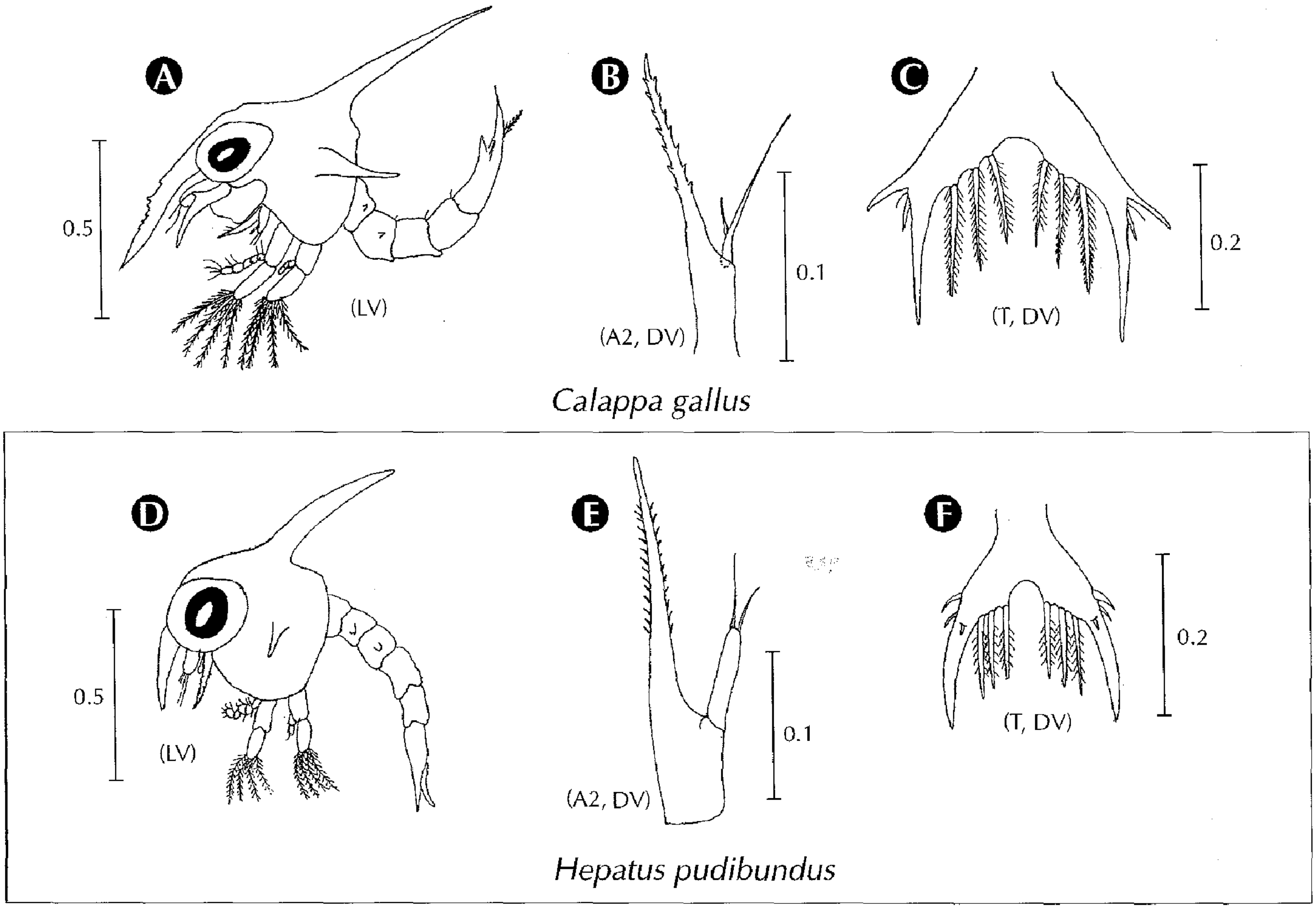


Fig. 20. First zoeae of Calappidae.A2: antenna; DV: dorsal view; LV: lateral view; T: telson; scale in mm. Sources, from Rieger and Hebling (1993): D-F; from Taishaku and Konishi (1995): A-C.

First zoeae of Calappidae

Species	Rostral spine
Hepatus pudibundus	smooth
Calappa gallus	5 - 10 spinules on anterior surface

Table 12. Species characters of first zoeae of Calappidae.

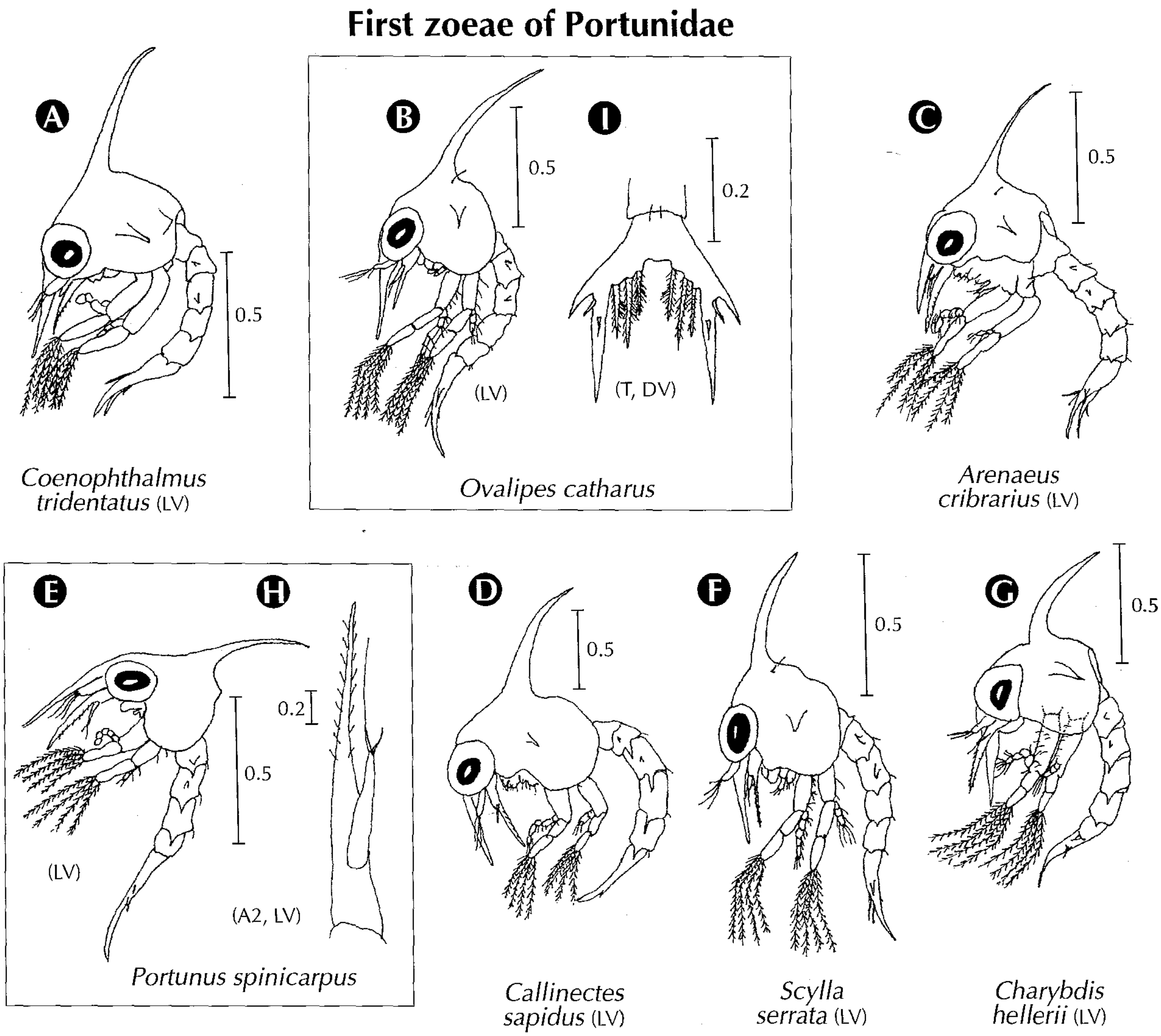


Fig. 21. First zoeae of Portunidae. A2: antenna; DV: dorsal view; LV: lateral view; T: telson; scale in mm. Sources, from Bookhout and Costlow (1974): E, H; from Boschi (1981): A; from Costlow and Bookhout (1959): D; from Negreiros-Fransozo (1996): G; from Stuck and Truesdale (1988): C; from Wear and Fielder (1985): B (originally fig. 130 on p. 51), F (orig. fig. 134 on p. 53), I (orig. fig. 127 on p. 51).

First zoeae of Portunidae

Subfamilies/Species	Abdominal somites 3-5	Telsonfurcal spines	Antennule setation	Maxilliped 1 endopod setation
PORTUNINAE				
Arenaeus cribrarius	serrate lateral projections	1 lateral, 1 dorsal	3 aesthetascs + 3 simple setae	2, 2, 0, 2, 5
Callinectes sapidus	prominent lateral spines overlaping the adjacent somite	1 lateral, 1 dorsal	3 aesthetascs + 2 simple setae	2, 2, 0, 2, 5
Portunus spinicarpus	prominent lateral spines overlaping the adjacent somite	1 lateral, 1 dorsal	3 aesthetascs + 3 simple setae	2, 2, 0, 2, 5
Scylla serrata	short lateral spines	1 lateral	3 aesthetascs + 1 simple seta	2, 2, 0, 2, 2
Charybdis hellerii	prominent lateral spines overlaping the adjacent somite	1 lateral, 1 dorsal	2 aesthetascs + 1 simple seta	3(2), 2, 0, 2(3), 5(6)
POLYBIINAE				
Coenophthalmus tridentatus	short lateral spines	1 dorsal	?	?
Ovalipes trimaculatus	short lateral spines	1 lateral, 1 dorsal	?	?
Ovalipes catharus	short lateral spines	1 lateral, 1 dorsal	3 aesthetascs + 1 simple seta	?
Ovalipes punctatus	short lateral spines	1 lateral, 1 dorsal	2 aethetascs + 3 simple setae	2, 2, 1, 2, 5

Table 13. Species characters of first zoeae of Portunidae.

Species	Number of larval stages		Described by
	Zoea	Megalopa	
FAMILY DROMIIDAE			
Cryptodromiopsis antillensis	6(7)	1	Rice and Provenzano, 1966
Dromia erythropus	5	1	Laughlin et al., 1982
Hypoconcha arcuata	3	1	Kircher, 1970
Hypoconcha sabulosa	3	1	Lang and Young, 1980
FAMILY HOMOLIDAE			
Homola barbata	7	1	Rice and Provenzano, 1970
FAMILY LATREILLIIDAE			
Latreillia elegans	2	1	Rice and Williamson, 1977; Rice, 1982
FAMILY DORIPPIDAE			
Ethusa microphthalma	4	1	Martin and Truesdale, 1989
FAMILY CALAPPIDAE			
Calappa gallus	1+		Taishaku and Konishi, 1995
Hepatus pudibundus	4 (5) (6)	1	Rieger and Hebling, 1993
FAMILY LEUCOSIIDAE			
Persephona mediterranea	4	1	Negreiros-Fransozo et al., 1989
FAMILY MAJIDAE			
Acanthonyx scutiformis (as *A. petiverii*)	2	1	Hiyodo et al., 1994
Anasimus latus	2	1	Sandifer and van Engel, 1972
Epialtus bituberculatus	2	1	Negreiros-Fransozo and Fransozo, 1996
Epialtus brasiliensis	2	1	Negreiros-Fransozo and Fransozo, 1991
Eurypodius latreillei	2	1	Campodonico and Guzmán, 1972
Libidoclaea granaria	2	1	Fagetti, 1969
Libinia ferreirae	2	1	Bakker et al., 1990
Libinia spinosa	2	1	Boschi and Scelzo, 1968
Macrocoeloma camptocerum	2	1	Yang, 1967
Microphrys bicornutus	2	1	Hartnoll, 1964; Gore et al., 1982
Mithraculus coryphe	2	1	Scotto and Gore, 1980
Mithraculus forceps	2	1	Wilson et al., 1979
Mithrax caribbaeus	2	1	Bolaños et al., 1990
Mithrax hispidus	2	1	Fransozo and Hebling, 1982
Mithrax verrucosus	2	1	Bolaños and Scelzo, 1981
Pitho lherminieri	2	1	Bolaños et al., 1996
Pyromaia tuberculata	2	1	Fransozo and Negreiros-Fransozo, 1997
Stenorhynchus seticornis	2	1	Yang, 1976
Taliepus dentatus	2	1	Fagetti and Campodonico, 1971

Species	Number of larval stages		Described by
	Zoea	Megalopa	
FAMILY PARTHENOPIDAE			
Parthenope (Platylambrus) serrata	6	1	Yang, 1971
FAMILY HYMENOSOMATIDAE			
Halicarcinus planatus	3	1	Boschi et al., 1969
FAMILY ATELECYCLIDAE			
Peltarion spinosulum	4	1	Iorio, 1983
FAMILY BELLIIDAE			
Acanthocyclus albatrossis	4	1	Campodonico and Guzmán, 1973
Acanthocyclus gayi	4	1	Fagetti and Campodonico, 1970
Corystoides chilensis	4	1	Boschi and Scelzo, 1970
FAMILY PORTUNIDAE			
Arenaeus cribrarius	8	1	Stuck and Truesdale, 1988
Callinectes sapidus	7(8)	1	Costlow and Bookhout, 1959
Charybdis hellerii	1+	1*	Negreiros-Fransozo, 1996
Coenophthalmus tridentatus	1+	1*	Boschi, 1981
Ovalipes catharus	8	1	Wear and Fielder, 1985
Ovalipes punctatus	6	1	Terada, 1980
Ovalipes trimaculatus	1+	1*	Boschi, 1981
Portunus spinicarpus	7	1	Bookhout and Costlow, 1974
Scylla serrata	5	1	Ong, 1964; Wear and Fielder, 1985
FAMILY XANTHIDAE			
Carpilius corallinus	5	1*	Laughlin et al., 1983
Cataleptodius floridanus	1	1*	Ingle, 1987
Eriphia gonagra	4	1	Fransozo, 1987
Eurypanopeus abbreviatus	4	1	Negreiros-Fransozo, 1986a
Eurytium limosum	4	1	Kurata et al., 1981; Messerknecht et al., 1991
Euypanopeus depressus	4	1	Costlow and Bookhout, 1961a
Garthiope barbadensis	3(4)	1	Gore et al., 1981
Hexapanopeus angustifrons	4	1	Costlow and Bookhout, 1966a
Hexapanopeus caribbaeus	4	1	Vieira and Rieger, in press
Hexapanopeus paulensis	4	1	Fransozo et al., 1989
Hexapanopeus schmitti	4	1	Bakker et al., 1989
Menippe nodifrons	5(6)	1	Scotto, 1979
Micropanope sculptipes	4	1	Andryszak and Gore, 1981
Panopeus americanus	4	1	Negreiros-Fransozo, 1986b
Panopeus austrobesus	4	1	Montú et al., 1988

Species	Number of larval stages		Described by
	Zoea	Megalopa	
Panopeus bermudensis	4	1	Martin et al., 1985
Panopeus herbstii	4	1	Costlow and Bookhout, 1961b
Panopeus occidentalis	4	1	Ingle, 1985
Pilumnus dasypodus	4	1	Sandifer, 1974; Bookhout and Costlow, 1979
Platyxanthus crenulatus	4	1	Menú-Marque, 1970; Boschi, 1981
Platyxanthus patagonicus	4	1	Iorio and Boschi, 1986
Xanthodius denticulatus	1+	1*	Lebour, 1944
Xanthodius parvulus	1+	1*	Lebour, 1944
FAMILY PINNOTHERIDAE			
Clypeasterophilus stebbingi	4	1	Marques and Pohle, 1996b
Dissodactylus crinitichelis	3	1	Pohle and Telford, 1981
Pinnaxodes chilensis	1+	1*	Gutiérrez-Martínez, 1971
Pinnixa chaetopterana	1+	?	Dowds, 1980; Sandifer, 1972
Pinnixa cristata	1+	?	Dowds, 1980
Pinnixa patagoniensis	5	1	Boschi, 1981
Pinnixa sayana	1+	?	Dowds, 1980
Tumidotheres maculatus	5	1	Costlow and Bookhout, 1966b
Zaops ostreum	4	1	Hyman, 1925; Sandifer, 1972; Sandoz and Hopkins, 1947
FAMILY GRAPSIDAE			
Aratus pisonii	4	1	Warner, 1968; Díaz and Bevilacqua, 1987
Armases angustipes	4	1	Kowalczuk, 1994
Chasmagnathus granulata	4(5)	1	Boschi et al., 1967
Cyclograpsus integer	5(6)	1	Gore and Scotto, 1982
Cyrtograpsus angulatus	5	1	Rieger and Vieira, 1997
Cyrtograpsus altimanus	5	1	Scelzo and de Bastida, 1979
Euchirograpsus americanus	5(6)	1	Wilson, 1980
Goniopsis cruentata	1+	1*	Fransozo et al., 1998
Grapsus grapsus = G. adcensionis	1+	1*	Lewis, 1960
Metasesarma rubripes	5	1	Díaz & Ewald, 1968; Montú et al., 1990
Pachygrapsus gracilis	13	1*	Ingle, 1987; Brossi-Gárcia and Rodrigues, 1993
Pachygrapsus transversus	11	1	Cuesta and Rodrigues, 1994
Percnon gibbesi	6	1	Paula and Hartnoll, 1989
Plagusia depressa	5	?	Wilson and Gore, 1980
Planes cyaneus	1+	1*	Konishi and Minagawa, 1990
Planes minutus	2	1	Lebour, 1944
Sesarma rectum	3	1	Fransozo and Hebling, 1986

Species	Number of larval stages		Described by
	Zoea	Megalopa	
FAMILY GECARCINIDAE			
Cardisoma guanhumi	5	1	Costlow and Bookhout, 1968
FAMILY OCYPODIDAE			
Ocypode quadrata	5	1	Díaz and Costlow, 1972
Uca burgersi	5(6)	1	Rieger, 1998
Uca mordax	5(6)	1	Rieger, 1992
Uca thayeri	5	1	Anger et al., 1990
Uca uruguayensis	5(6)	1	Rieger, 1996
Uca vocator	4(5-6)	1	Rieger, 1992
Ucides cordatus	5(6)	1	Rodrigues and Hebling, 1989
FAMILY CRYPTOCHIRIDAE			
Troglocarcinus corallicola	5	?	Scotto and Gore, 1981

Table 14. Southwest Atlantic species of brachyuran crabs with known larval development and respective references. +: with additional undescribed stages; *: incomplete description; ?: unknown. Numbers in brackets include optional additional stage(s).

Identification of crab species in the megalopa phase

This last larval stage is the least well known among crab larvae, unrecognized in some species with known zoeal stages and being poorly described in other cases. While megalopae show many distinct features, these characters are often not suitable for identification because they are not available for enough species to be useful for comparative purposes. There are also few obvious features that readily characterize members of specific families. This complicates identification to a point that does not allow for the construction of keys that are easy to follow. Thus, for identification purposes the reader should instead note the size and gross morphological features of collected specimens (see below), and then compare these with the illustrations provided (Fig. 22-27). Subsequently, Tables 15-19 can be used for identification verification, by checking patterns of appendage setation.

Gross-morphological features that should be used in the identification process include the following:

1. Relative size of specimens in terms of carapace length or width, some being much larger (e.g. *Ocypode quadrata*) than others (e.g. *Clypeasterophilus stebbingi*).
2. Relative shape of the carapace, by comparing length to width, and the shape and width of the anterior margin between eyes (e.g. contrast *Aratus pisonii, Armases angustipes,* and *Acanthonyx scutiformis*).
3. Ornamentation of the carapace; this can range from a smooth surface (e.g., *Dissodactylus crinitichelis*), hairy appearance (*Cryptodromiopsis antillensis*), to cuticular projections in specific locations that range from rounded knobs (*Mithrax hispidus*) to "antlers" (*Latreillia elegans*) and spines of various lengths (e.g., compare *Libinia spinosa* and *Tumidotheres maculatus*).
4. Characteristics of pereopods: note the relative length of walking legs to the carapace (e.g., very long for *Stenorhynchus*, short in *Libinia* and *Taliepus*), the absence or presence of long swimming setae on the dactyls of the last pair of legs (e.g., compare *Dissodactylus crinitichelis* and *Tumidotheres maculatus*), and if the same dactyl is turned upward (e.g., in dromiids) or not (the common feature).
5. Projections on the sternum and abdomen, such as distinct spines that may be present (e.g. portunids) or absent (e.g. pinnotherids).

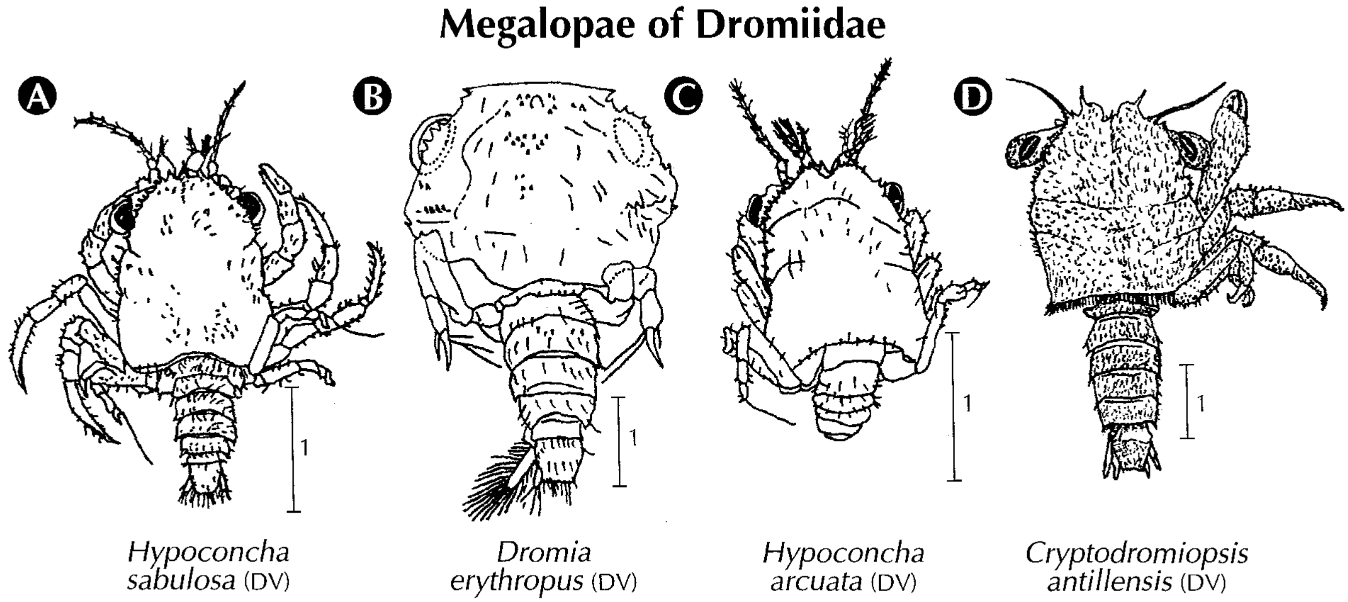


Fig. 22. Megalopae of Dromiidae. DV: dorsal view; scale in mm. Sources, from Kircher (1970): C; from Lang and Young (1980): A; from Laughlin *et al.* (1982): B; from Rice and Provenzano (1966): D.

Family and species	Carapace outgrowths	Mx1 endopod setation	Mx2 endopod setation	Mxp2 exopod setation	Mxp3 exopod setation
DROMIIDAE					
Cryptodromiopsis antillensis	with spines; 'hairy'	2, 4	8	10, 12	4, 9
Dromia erythropus	with spines	0, 2, 4	6	1, 3, 7	10, 2
Hypoconcha arcuata	with spines	5	4	2, 6	1, 6
Hypoconcha sabulosa	anterodorsal spines	2, 2, 4	1, 5	2, 7	0, 7
LATREILLIIDAE					
Latreillia elegans	spines and extremely long 'antlers'	5	3	0, 6	3, 5
CALAPPIDAE					
Hepatus pudibundus	smooth	4	6	4	6, 1
LEUCOSIIDAE					
Persephona mediterranea	mid- and posterodorsal spines	0	0	0, 3	11

Table 15. Morphological characters based on original descriptions (see Table 14) of the megalopa of seven species among four brachyuran families from the South Atlantic. Setation data refer to numbers of setae per segment, progressing proximally to distally. Mx1: maxillule; Mx2: maxilla; Mxp2: maxilliped 2; Mxp3: maxilliped 3.

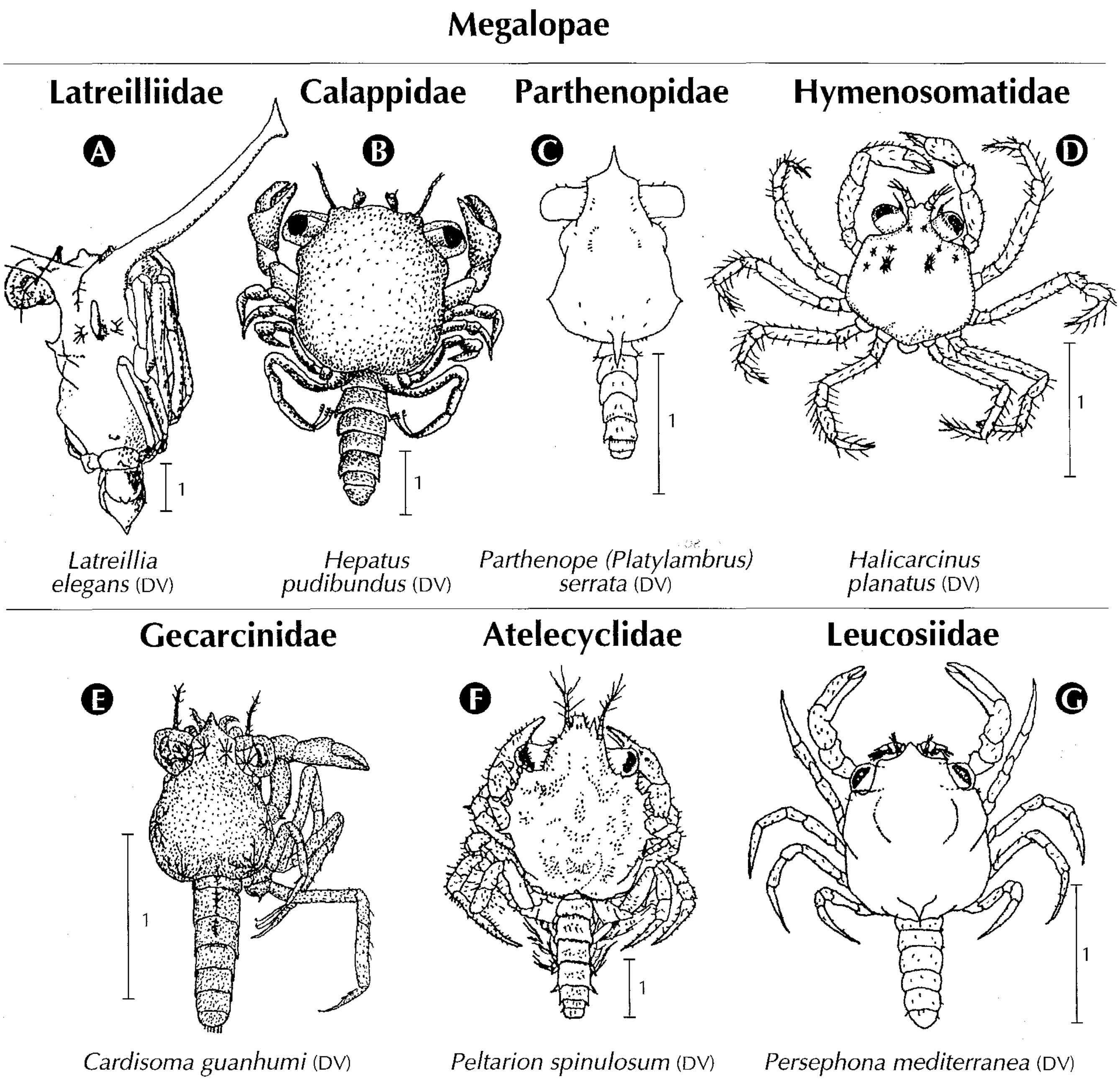


Fig. 23. Megalopae of Latreilliidae, Calappidae, Parthenopidae, Hymenosomatidae, Gecarcinidae, Atelecyclidae, and Leucosiidae. DV: dorsal view; scale in mm. Sources, from Boschi *et al.* (1969): D; from Costlow and Bookhout (1968): E; from Iorio (1983): F; from Negreiros-Fransozo *et al.* (1989): G; from Rice and Williamson (1977): A; from Rieger and Hebling (1993): B; from Yang (1971): C.

Acknowledgements

We thank Dr. Gustavo A. S. de Melo from the Museum of Zoology at the University of São Paulo (MZUSP) for providing taxonomic and biogeographical data. Other information was kindly provided by Drs. Nilton J. Hebling from the Universidade Estadual Paulista in Rio Claro, Brazil, Austin B. Williams from the National Museum of Natural History in Washington, USA, Lucrecia C. Zolessi from the Museum of Natural History in Montevideo, Uruguay, Danilo K. de Calazans from Fundação Universidade de Rio Grande, Brazil, and Mr. Ignacio González-Gordillo from the Institute of Marine Sciences in Andalucía, Spain. Dr.

Richard E. Dowds is thanked for providing illustrations and descriptions of the gennus *Pinnixa*.

Suggested readings

Boschi E.E. 1981. Larvas de Crustacea Decapoda. In "Atlas del Zooplancton del Atlántico Sudoccidental y métodos de trabajo con el zooplancton marino" (D. Boltovskoy, ed.), Public. Esp. Inst. Nac. Inv. Desarrollo Pesq., Mar del Plata, pp. 699-757. *Albeit a somewhat outdated study, it covers non-brachyuran decapods and stomatopods from the area that are not included in the present work.*

Felder D.L., Martin J.W., Goy J.W. 1985. Patterns in early postlarval development of decapods. In "Larval growth" (A.M. Wenner, ed.), Crustacean Issues Vol. 2, A. Balkema, Rotterdam, pp. 163-225. *A good review of decapod developmental patterns.*

Gore R.H. 1985. Molting and growth in decapod larvae. In "Larval growth" (A.M. Wenner, ed.), Crustacean Issues Vol. 2, A. Balkema, Rotterdam, pp. 1-66. *A good review of decapod larval development that complements Felder et al. (1985).*

Gurney R. 1942. The larvae of decapod Crustacea. Ray Soc. Publ., London, pp. 1-306. *The classic but still informative review of decapod larvae.*

Ingle R.W. 1992. Larval stages of northeastern Atlantic crabs. Natur. Hist. Publ., Chapman & Hall, London, pp. 1-363. *An excellent and very detailed account of larvae that includes relevant information on morphology, rearing methods, and a revealing account of the earliest larval studies.*

Marques F., Pohle G. 1995. Phylogenetic analysis of the Pinnotheridae (Crustacea: Brachyura) based on larval morphology, with emphasis on the *Dissodactylus* species complex. Zool. Scripta, 24:347-365. *One of very few larval phylogenetic studies using strict cladistic methodology.*

Megalopae of Belliidae

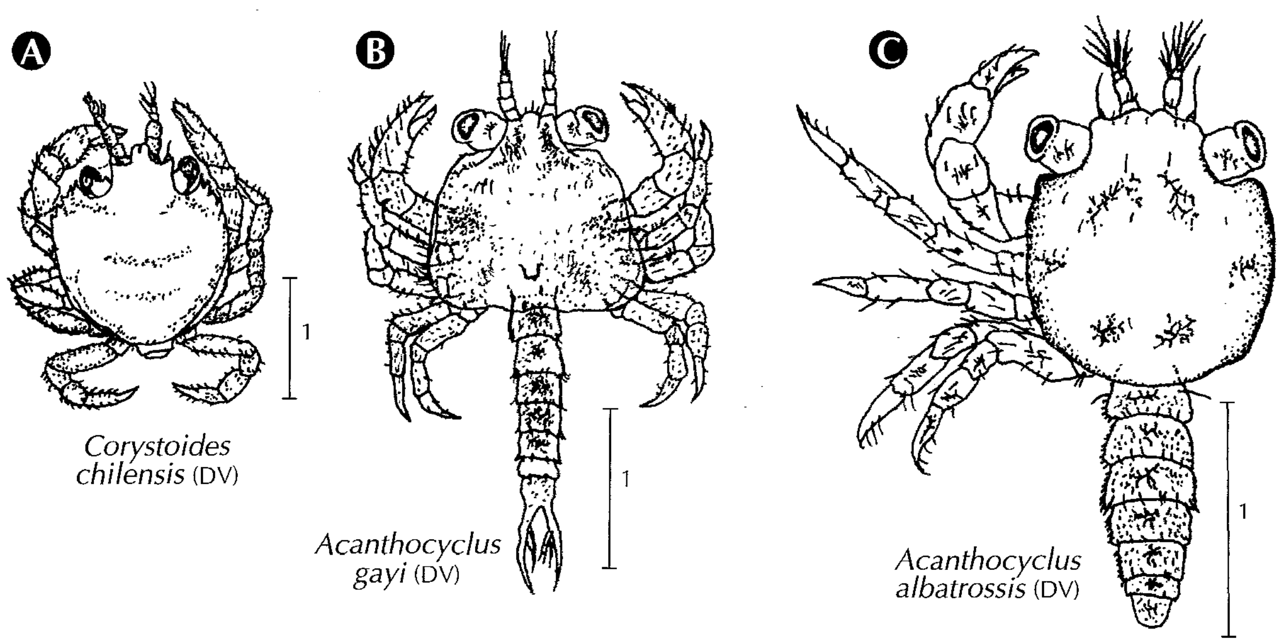


Fig. 24. Megalopae of Belliidae. DV: dorsal view; scale in mm. Sources, from Boschi and Scelzo (1970): A; from Campodónico and Guzmán (1973): C; from Fagetti and Campodónico (1970): B.

Megalopae of Portunidae

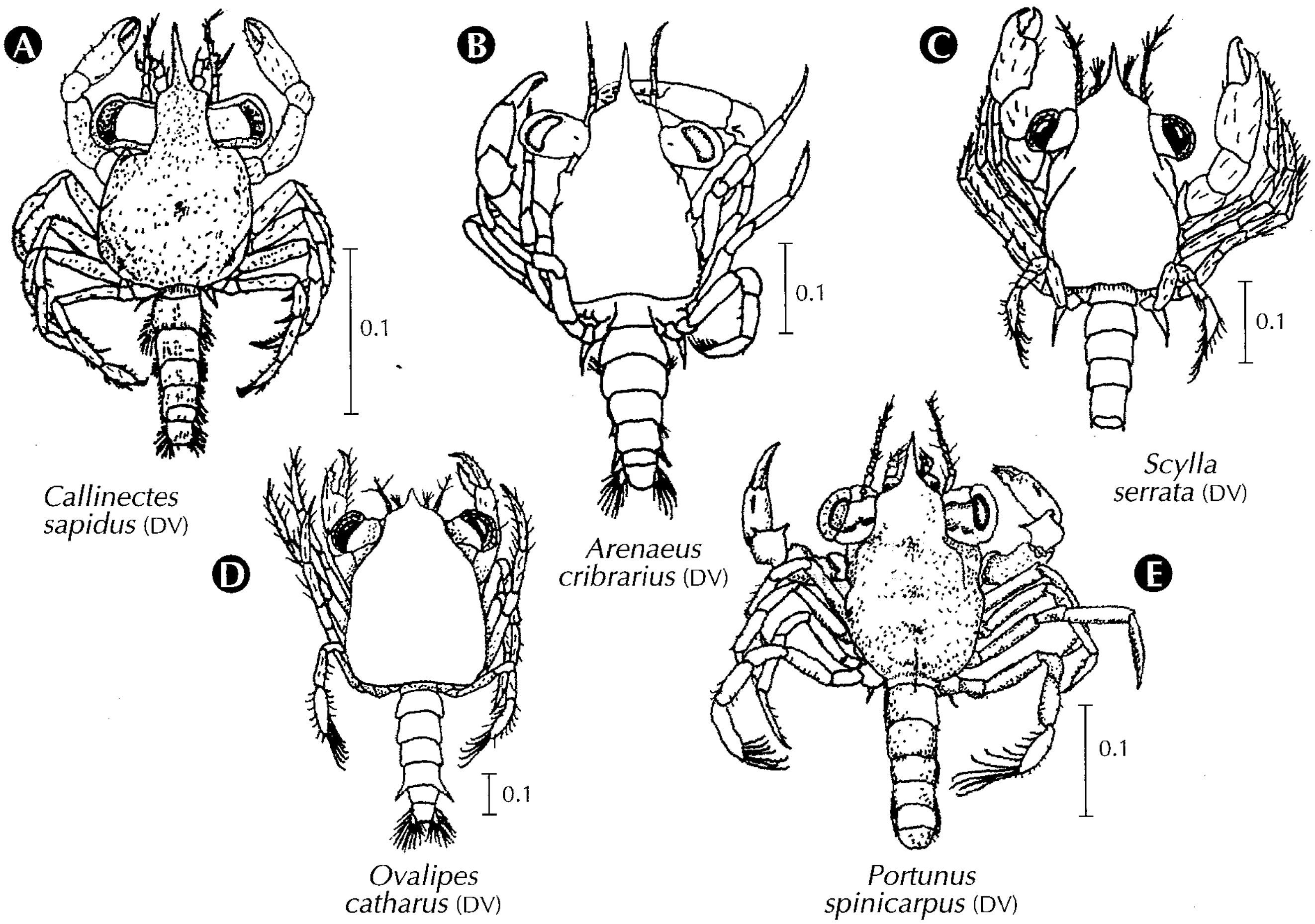


Fig. 25. Megalopae of Portunidae. DV: dorsal view; scale in mm. Sources, from Bookhout and Costlow (1974): E; from Costlow and Bookhout (1959): A; from Stuck and Truesdale (1988): B; from Wear and Fielder (1985): C-D (orig. fig. 132 on p. 51).

McConaugha J.R. 1985. Nutrition and larval growth. In "Larval growth" (A.M. Wenner, ed.), Crustacean Issues Vol. 2, A. Balkema, Rotterdam, pp. 127-154. *A review and analysis showing the importance of nutrition in growth and development through the larval stages.*

Paula J. 1996. A key and bibliography for the identification of zoeal stages of brachyuran crabs (Crustacea, Decapoda, Brachyura) from the Atlantic coast of Europe. J. Plankton Res., 18:17-27. *A good guide to the identification of zoeal stages of brachyuran crabs.*

Pohle G., Marques F. 1998. Phylogeny of the Pinnotheridae: larval and adult evidence, with emphasis on the evolution of gills. Invertebrate Reproduction and Development, 33:229-239. *A rare phylogenetic study that includes larval and adult evidence in the reconstruction of evolutionary relationships.*

Rice A.L. 1980. Crab zoeal morphology and its bearing on the classification of the Brachyura. Trans. Zool. Soc. London, 35:271-424. *A classic work and first serious attempt at summarizing the copious larval information since Gurney's (1942) review.*

Rice A.L. 1983. Zoeal evidence for brachyuran evolution. In "Crustacean phylogeny" (F.R. Schram, ed.), Crustacean Issues Vol. 1, A. Balkema, Rotterdam, pp. 313-329. *A complementary article to the 1980 work that focuses on the evolution of primitive and more advanced groups of crabs based on larval information.*

Schmitt W.L. 1971. Crustaceans. Univ. Michigan Press, Ann Arbor, pp. 1-204. *An old but very readable and informative text on Crustacea in general.*

Scholtz G., Richter S. 1995. Phylogenetic systematics of the reptantian Decapoda (Crustacea, Malacostraca). Zool. J. Linn. Soc., 113:289-328. *The most recent comprehensive study on the relationships of the major decapod groups.*

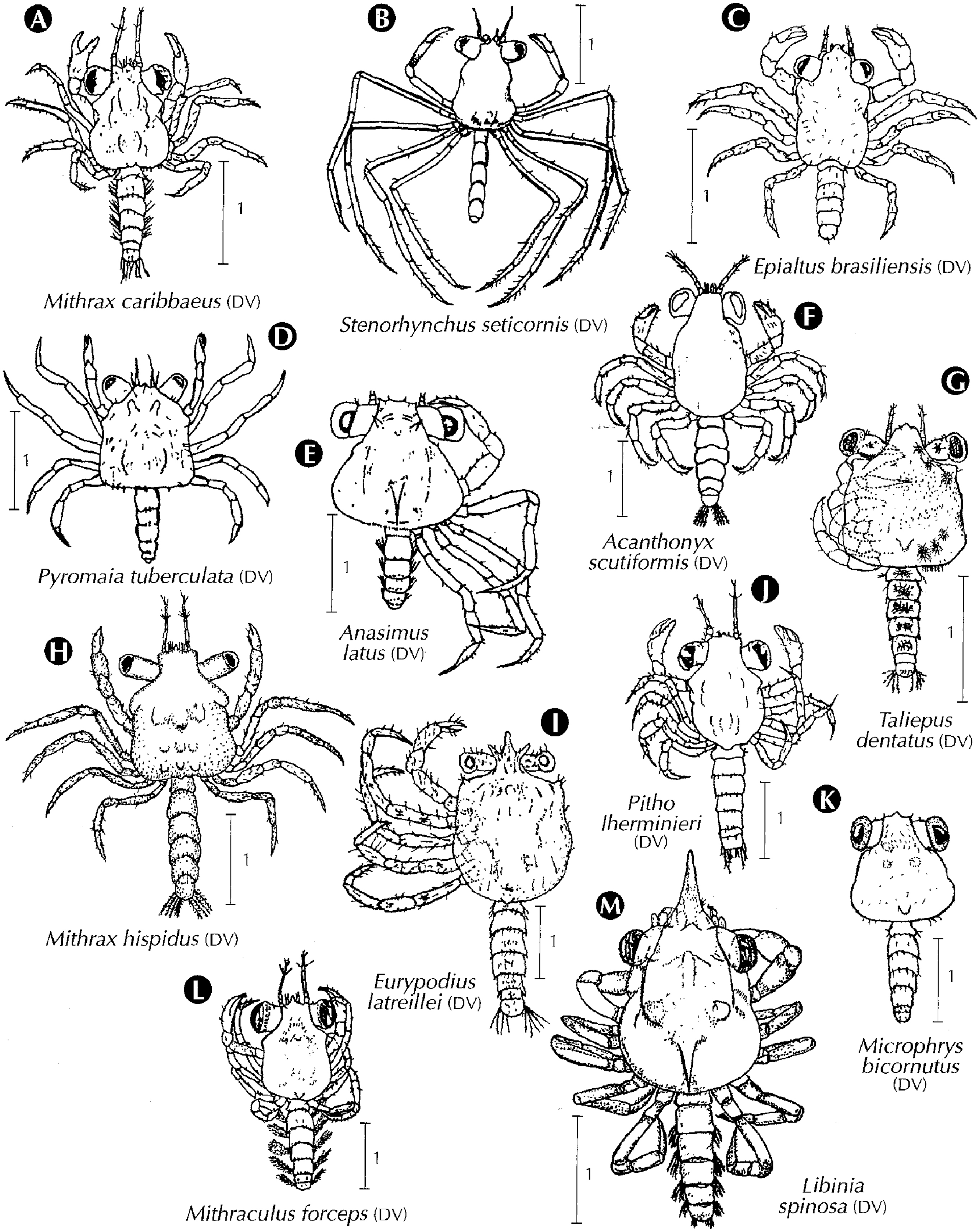
Warner G.F. 1977. The biology of crabs. Van Nostrand Rheinhold, New York, pp. 1-202. *A good account of many aspects of crab biology, including life histories.*

Williamson D.I. 1982. Larval morphology and diversity. In "Biology of Crustacea. Vol. **2.** Embryology, morphology, and genetics" (L.G. Abele, ed.), Acad. Press, NewYork, pp. 43-110. *The most detailed account of larval morphology and diversity; includes comprehensive keys.*

Family and species	**Rostrum orientation and morphology**	**Carapace outgrowths or spines on sternal segment 4**	**Mx1 endopod setation**	**Mx2 endopod setation**	**Mxp1 epipod setation**	**Mxp3 epipod setation**
HYMENOSOMATIDAE						
Halicarcinus planatus	directed anteriorly	carapace smooth	0	4	2	21
ATELECYCLIDAE						
Peltarion (Platylambrus)spinulosum	deflected ventrally	carapace with spines	4	7	14	25
BELLIIDAE						
Acanthoc clus albatrossis	short	carapace smooth	1, 2	2	11	13
Acanthocyclus gayi	short/bilobed	carapace with protuberances	2, 4	7	8	15
Corystoides chilensis	short/bilobed	carapace with anterolateral spines	2, 2	4	8	14
PORTUNIDAE						
Arenaeus cribrarius	directed anteriorly, developed	sternal spines present	2, 2	5	26	24
Callinectes sapidus	directed anteriorly, developed	sternal spines present	6, 4	3	18	18
Ovalipes catharus	deflected ventrally	sternal spines present	?	?	?	?
Portunus spinicarpus	directed anteriorly, developed	sternal spines present	6, 2	3	26	15
Scylla serrata	directed anteriorly, developed	sternal spines present	3, 2	5	± 23	± 27

Table 16. Morphological characters based on original descriptions (see Table 14) of the megalopa of ten species among four families from the South Atlantic. Setation data refer to numbers of setae per segment, progressing proximally to distally. Abbreviations as in Table 15.

Megalopae of Majidae



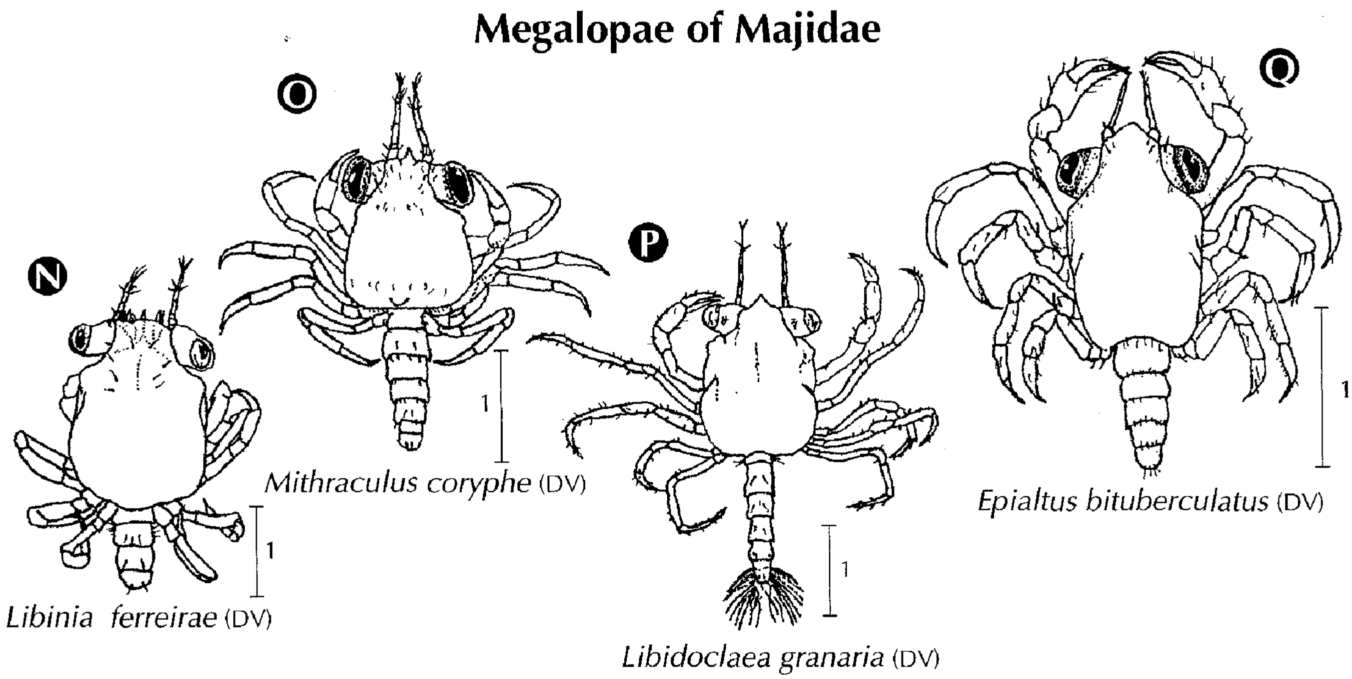
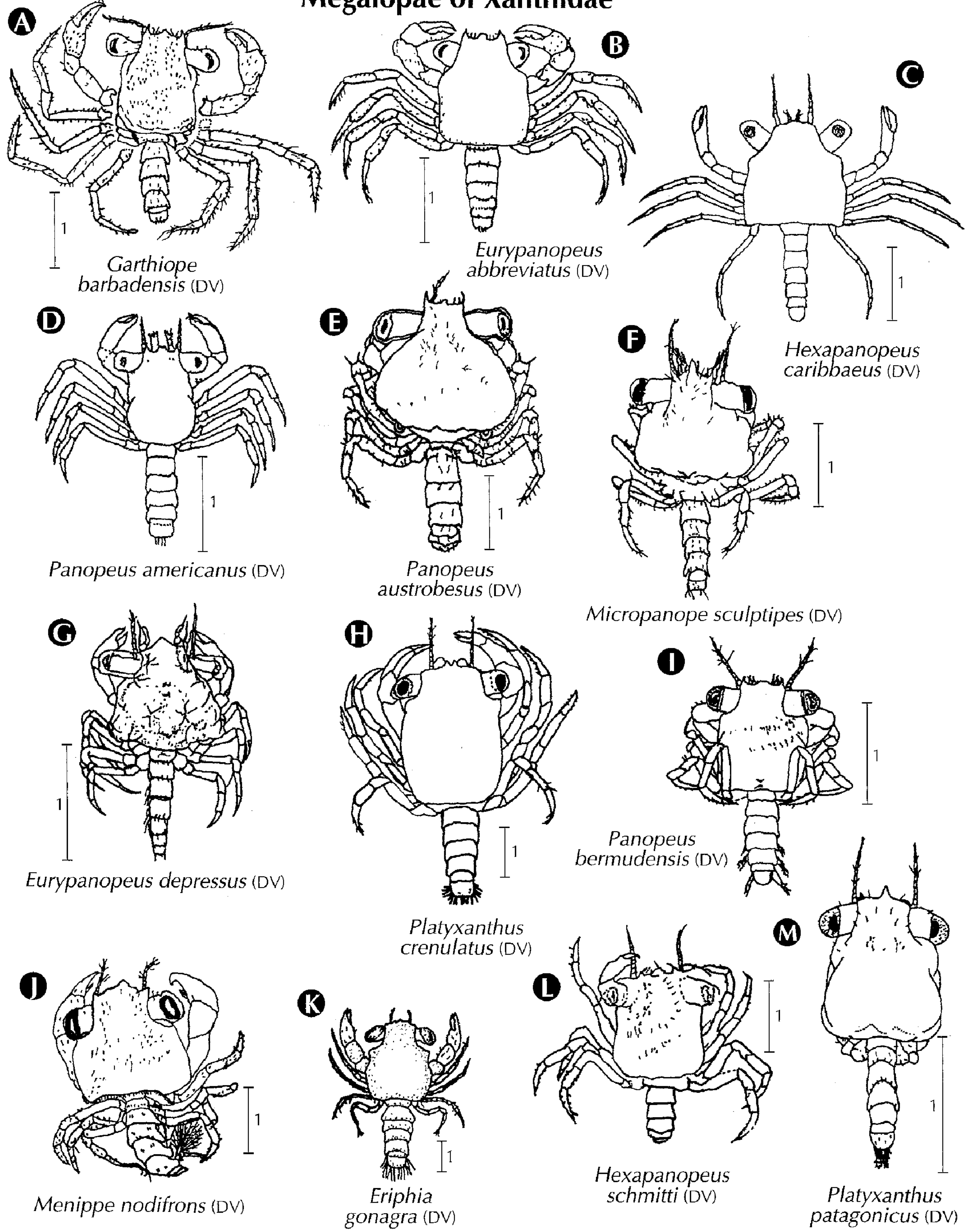


Fig. 26. Megalopae of Majidae. DV: dorsal view; scale in mm. Sources, from Bakker *et al.* (1990): N; from Bolaños *et al.* (1990): A; from Bolaños *et al.* (1996): J; from Boschi and Scelzo (1968): M; from Campodónico and Guzmán (1972): I; from Fagetti (1969): P; from Fagetti and Campodónico (1971): G; from Fransozo and Hebling (1982): H; from Fransozo and Negreiros-Fransozo (1997): D; from Gore *et al.* (1982): K; from Hiyodo *et al.* (1994): F; from Negreiros-Fransozo and Fransozo (1991): C; from Negreiros-Fransozo and Fransozo (1996): Q; from Sandifer and van Engel (1972): E; from Scotto and Gore (1980): O; from Wilson *et al.* (1979): L; from Yang (1976): B.

Family and species	Rostrum orientation	Carapace outgrowths	Mx1 endopod setation	Mx2 endopod setation	Mxp1 epipod setation	Mxp3 epipod setation
MAJIDAE						
Acanthonyx scutiformis	deflected ventrally	smooth	1,1	0	6	3
Anasimus latus	?	spines/protuberances	0	1	4	3
Epialtus bituberculatus	deflected ventrally	smooth	0	0	5	6
Epialtus brasiliensis	deflected ventrally	smooth	0	0	7	10
Eurypodius latreillei	deflected ventrally	spines	3	2	12	2
Libidoclaea granaria	directed anteriorly?	protuberances	1	0	14	9
Libinia ferreirae	deflected ventrally	protuberances	4	2	7	9
Libinia spinosa	deflected ventrally	spines/protuberances	2	0	4	6
Microphrys bicornutus	deflected ventrally	protuberances	0	0	5	5
Mithraculus coryphe	directed anteriorly	protuberances	0	0	6/7	2/8
Mithraculus forceps	directed anteriorly	protuberances	0	0	5	5
Mithrax caribbaeus	deflected ventrally	protuberances	0,2	0	6	5
Mithrax hispidus	directed anteriorly	protuberances	0	2	5	3
Pitho lherminieri	deflected ventrally	protuberances	0,2	0	5	6
Pyromaia tuberculata	directed anteriorly	protuberances	0,2	0	7	8
Stenorhynchus seticornis	deflected ventrally	spines/protuberances	0,4	3	8	5 ?
Taliepus dentatus	directed anteriorly?	protuberances	3	2	11	9
PARTHENOPIDAE						
Parthenope (Platylambrus) serrata	deflected ventrally	posterodorsal spines	7	8	7	10

Table 17. Morphological characters based on original descriptions (see Table 14) of the megalopa of 18 species among Majidae and Parthenopidae from the South Atlantic. Setation data refer to numbers of setae per segment, progressing proximally to distally. Abbreviations as in Table 15.

Megalopae of Xanthidae



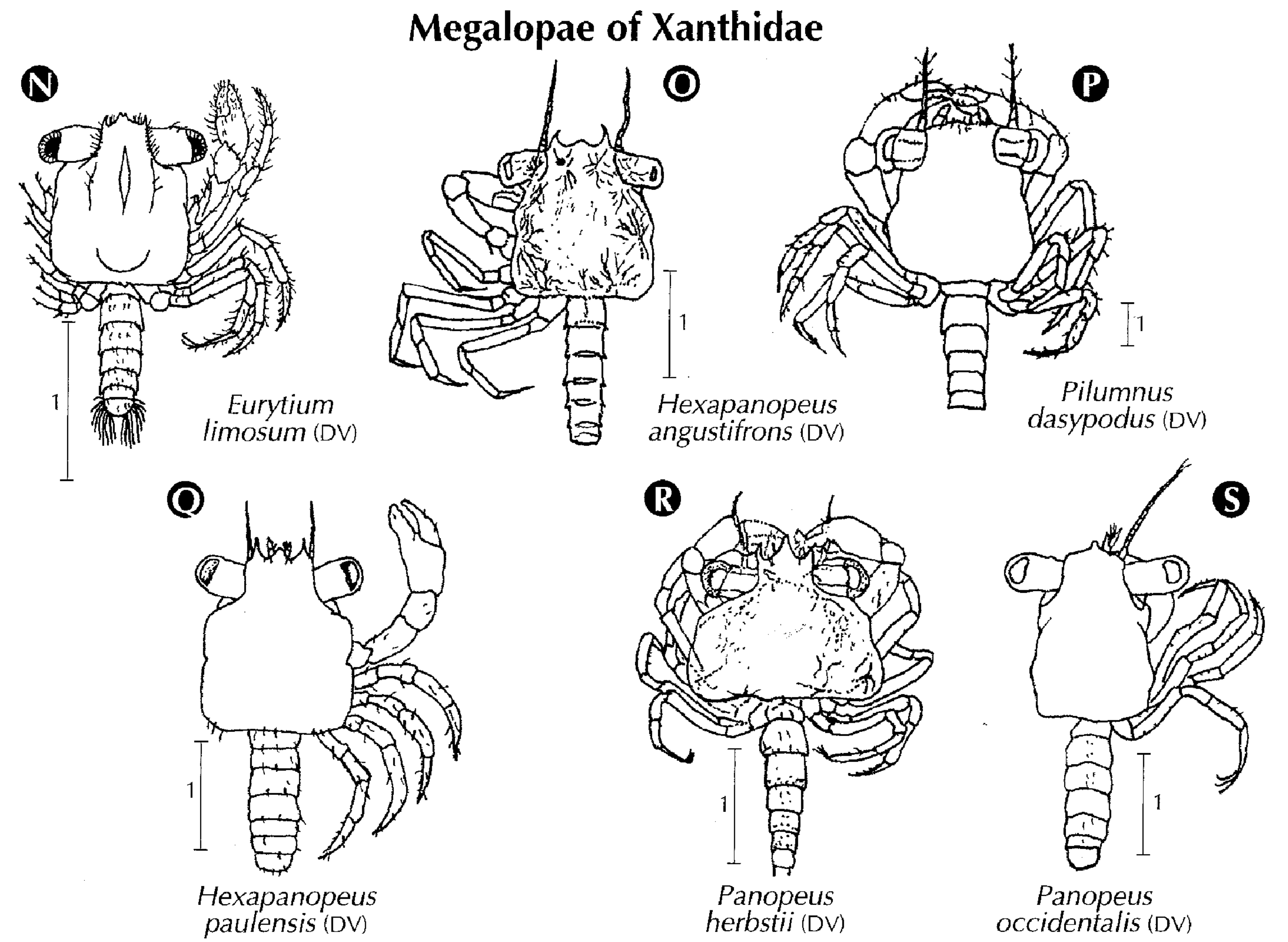


Fig. 27. Megalopae of Xanthidae. DV: dorsal view; scale in mm. Sources, from Andryszak and Gore (1981): F; from Bakker *et al.* (1989): L; from Bookhout and Costlow (1979): P; from Costlow and Bookhout (1961a): G; from Costlow and Bookhout (1961b): R; from Costlow and Bookhout (1966a): O; from Fransozo (1987): K; from Fransozo *et al.* (1989): Q; from Gore *et al.* (1981): A; from Ingle (1985): S; from Iorio and Boschi (1986): M; from Kurata *et al.* (1981): N; from Martin *et al.* (1985): I; from Menú-Marque (1970): H; from Montú *et al.* (1988): E; from Negreiros-Fransozo (1986a): B; from Negreiros-Fransozo (1986b): D; from Scotto (1979): J; from Vieira and Rieger (in press): C.

Species	Rostrum orientation and morphology	Carapace outgrowths	Mx1 endopod setation	Mx2 endopod setation	Mxp1 epipod setation	Mxp3 epipod setation
XANTHIDAE						
Eriphia gonagra	short, deflected ventrally	smooth	3,4	5	18	38
Eurypanopeus abbreviatus	short, deflected ventrally	smooth	3	4	5	16
E. depressus	short, deflected ventrally	protuberances	1,6	8	7	12
Eurytium limosum	directed anteriorly	protuberances	?	?	?	?
Garthiope barbadensis	short, deflected ventrally	smooth	5	5	7	15
Hexapanopeus angustifrons	short, deflected ventrally	smooth	7	7	7	± 20
H. caribbaeus	short, deflected ventrally	smooth	1,2	2	6	20
H. paulensis	short, deflected ventrally	smooth	4	2	8	18
H. schmitti	short, directed anteriorly	smooth	2,3	2	9	13-15
Menippe nodifrons	short, directed anteriorly	smooth	1,4	4-6	12-26	26-36
Micropanope sculptipes	deflected ventrally	protuberances	?	?	?	?
Panopeus americanus	short	smooth	2,3	1	7	12
P. austrobesus	short, deflected ventrally	smooth	1,4	8(9)	6	6
P. bermudensis	short	smooth	2,3	1	5	16
P. herbstii	short	smooth	4,3	7	7	20
P. occidentalis	short, deflected ventrally	smooth	5	1(2)	1(2)	6(7)
Pilumnus dasypodus	short, directed anteriorly	smooth	1(2), 4(6)	9	5	11(13)
Platyxanthus crenulatus	short, bifid	smooth	4	9	10	20
P. patagonicus	short, deflected ventrally	smooth	4	6	7	20

Table 18. Morphological characters based on original descriptions (see Table 14) of the megalopa of 19 species of Xanthidae from the South Atlantic. Setation data refer to numbers of setae per segment, progressing proximally to distally. Abbreviations as in Table 15.

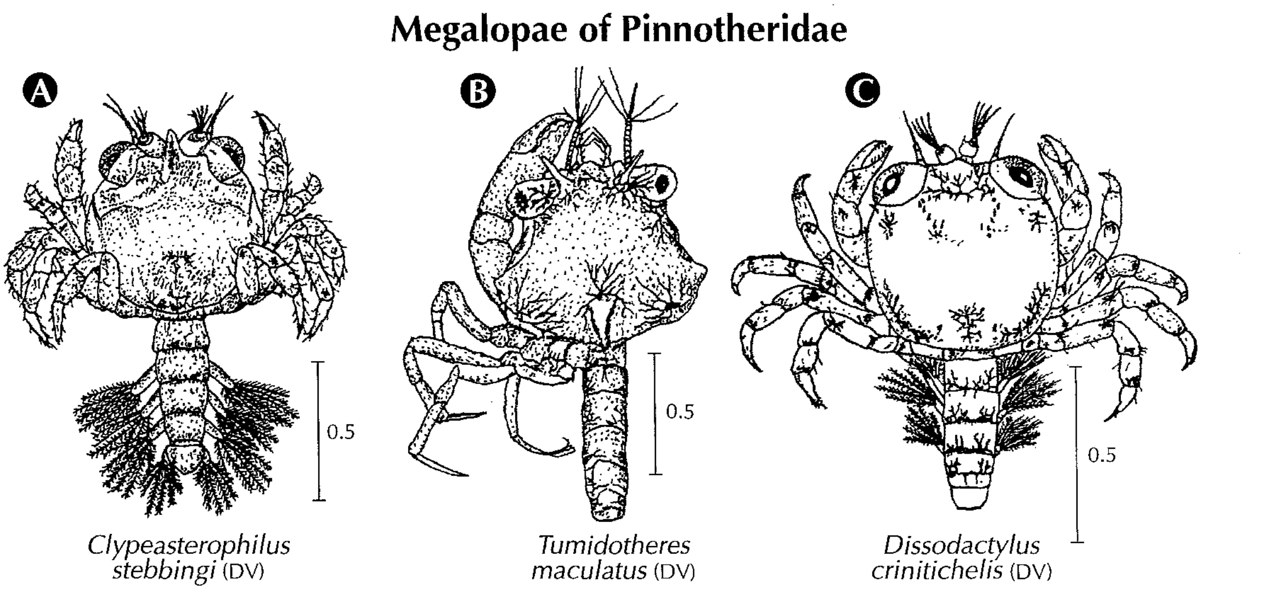
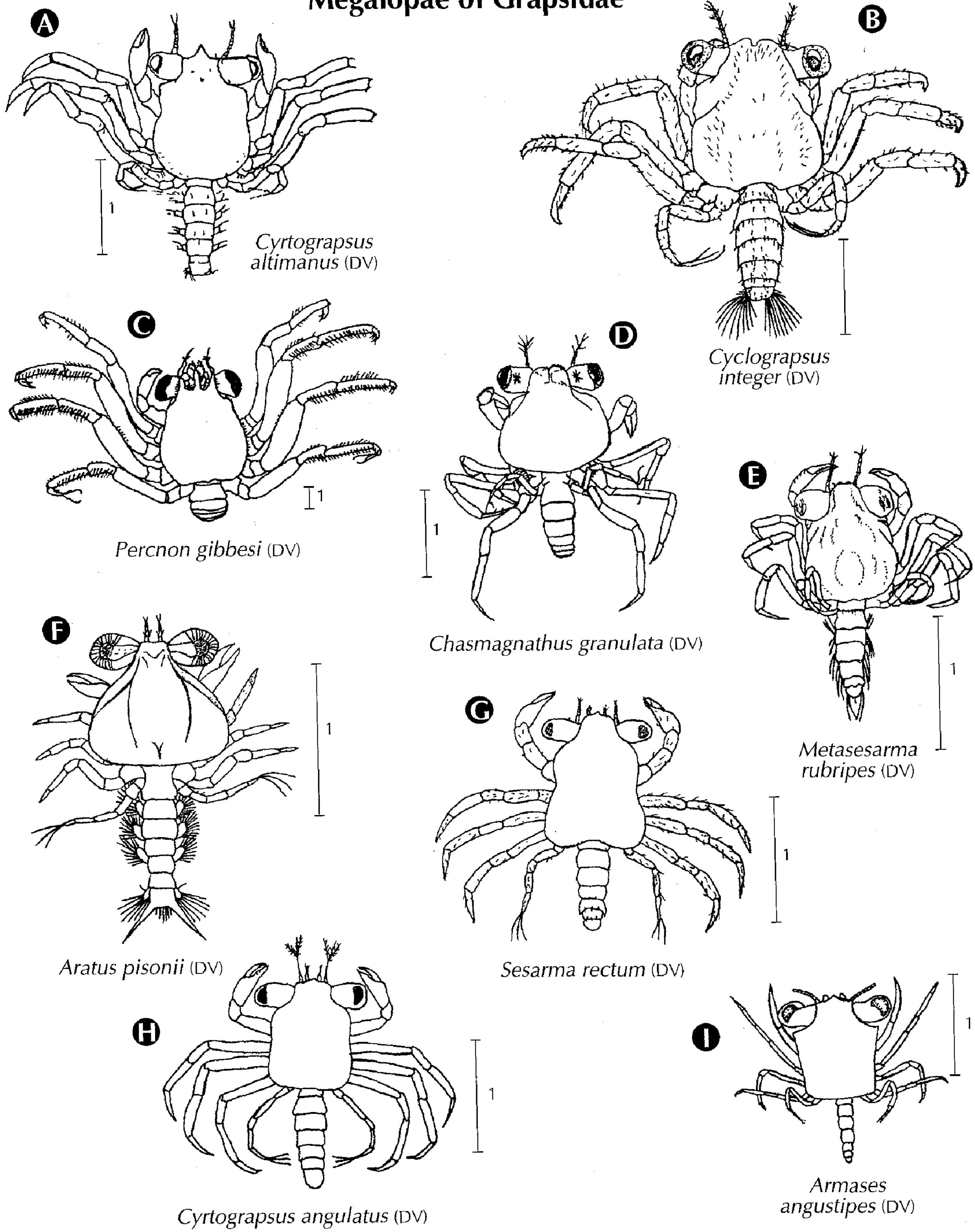


Fig. 28. Megalopae of Pinnotheridae. DV: dorsal view; scale in mm. Sources, from Costlow and Bookhout (1966b): B; from Marques and Pohle (1996b): A; from Pohle and Telford (1981): C.

Family and species	Rostrum orientation and morphology	Carapace outgrowths	Mx1 endopod setation	Mx2 endopod setation	Mxp1 epipod setation	Mxp3 epipod setation
PINNOTHERIDAE						
Clypeasterophilus stebbingi	directed anteriorly	smooth	1, 1	2	4	26 ?
Dissodactylus crinitichelis	absent	smooth	0, 4	3	4	16
Tumidotheres maculatus	short	three long spines	2, 1	0	4	21 ?
GRAPSIDAE						
Aratus pisonii	absent	dorsal spine	1, 5	5	?	?
Armases angustipes	short	smooth	3, 4	0	7	16
Chasmagnathus granulata	absent	smooth	5	0	7	16
Cyclograpsus integer	deflected ventrally	smooth	6	2	9	± 35
Cyrtograpsus angulatus	short, deflected ventrally	smooth	1, 3	0	7	22
C. altimanus	deflected ventrally	smooth	6	2	8	35
Metasesarma rubripes	short	smooth	2, 3	0	7	20
Percnon gibbesi	trifid	smooth	?	?	?	?
Sesarma rectum	short	protuberances	1, 5	0	5	15
GECARCINIDAE						
Cardisoma guanhumi	deflected ventrally	smooth	2, 4	6	9	25
OCYPODIDAE						
Ocypode quadrata	deflected ventrally	smooth	3	7	± 20	± 54
Uca burgersi	deflected ventrally	smooth	1, 2	2	7	17
U. mordax	deflected ventrally	smooth	1, 1	0	6	19
U. thayeri	deflected ventrally	smooth	0, 4	0	7	16
U. uruguayensis	deflected ventrally	smooth	2	0	6(7)	± 19
U. vocator	deflected ventrally	smooth	0, 1	2	5	13
Ucides cordatus	deflected ventrally	smooth	0, 5	6	10	32

Table 19. Morphological characters based on original descriptions (Table 14) of the megalopae of 20 species among 4 families from the South Atlantic. Setation data refers to numbers of setae per segment, progressing proximally to distally. Abbreviations as in Table 15.

Megalopae of Grapsidae



Megalopae of Ocypodidae

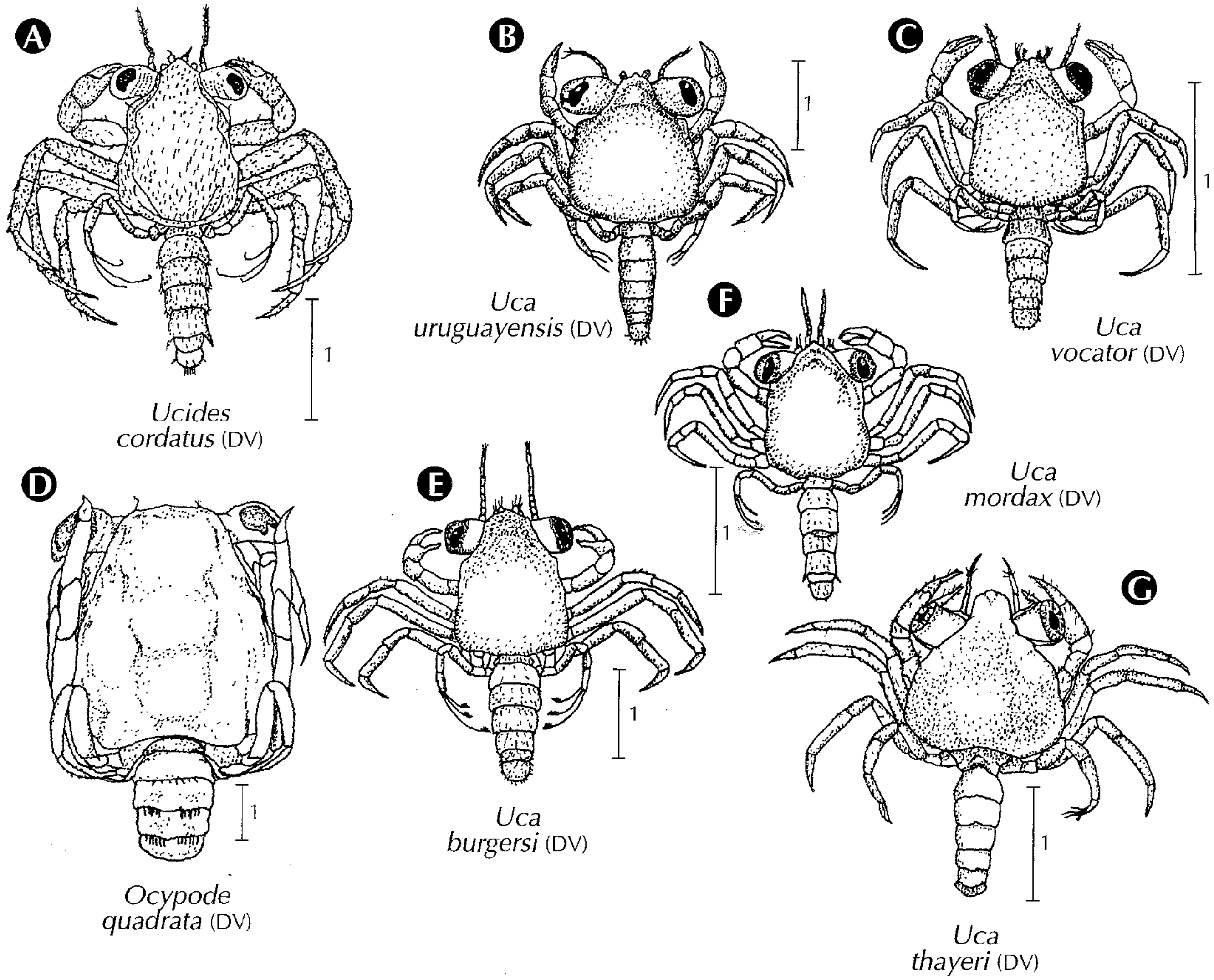


Fig. 30. Megalopae of Ocypodidae. DV: dorsal view; scale in mm. Sources, from Anger *et al.* (1990): G; from Díaz and Costlow (1972): D; from Rieger (1992): C, F; from Rieger (1996): from Rieger (1998): E; B; from Rodrigues and Hebling (1989): A.

Fig. 29. Megalopae of Grapsidae. DV: dorsal view; scale in mm. Sources, from Boschi *et al.* (1967): D; from Díaz and Ewald (1968): E (orig. fig. 5 on p. 235); from Fransozo and Hebling (1986): G; from Gore and Scotto (1982): B; from Kowalczuk (1994): I; from Paula and Hartnoll (1989): C; from Rieger and Vieira (1997): H; from Scelzo and Lichstein de Bastida (1979): A; from Warner (1968): F.