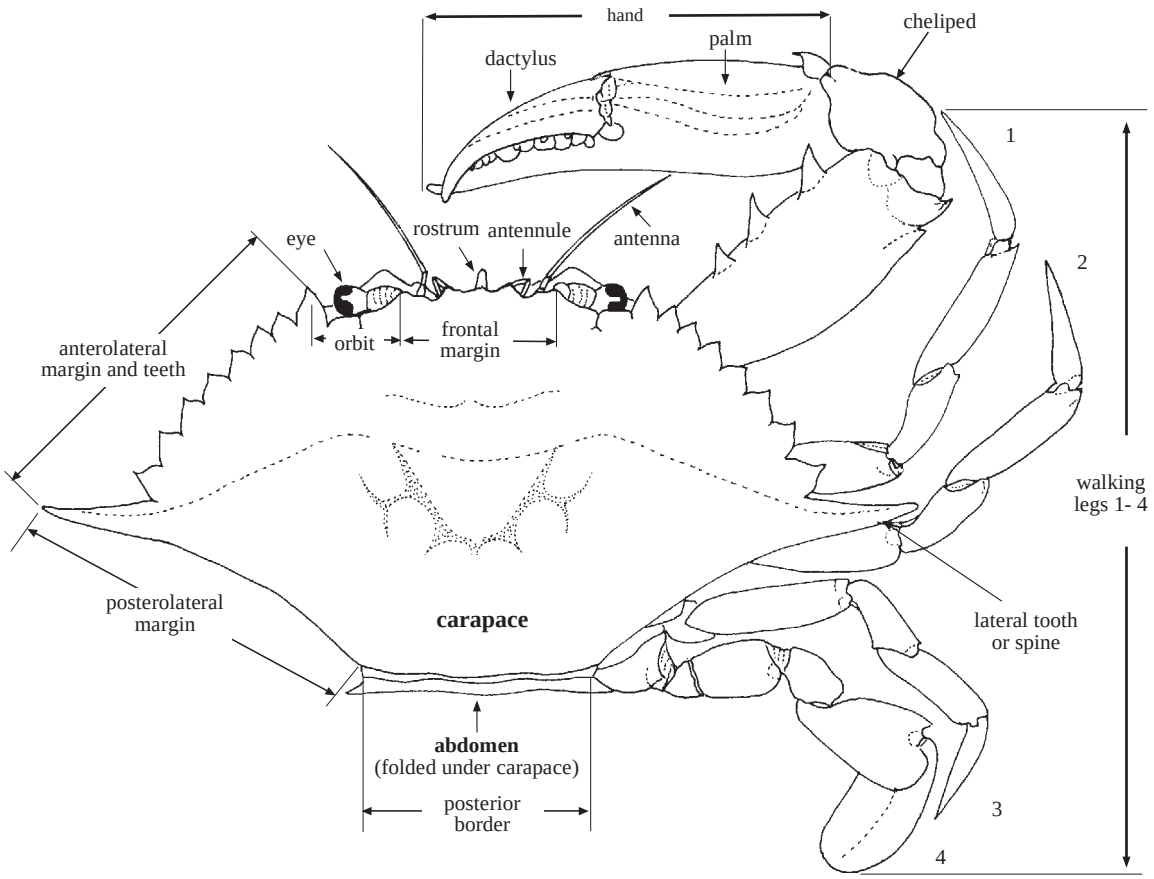
click for previous page

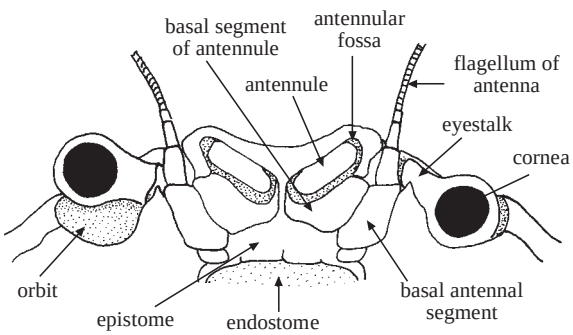
CRABS

by P.K.L. Ng

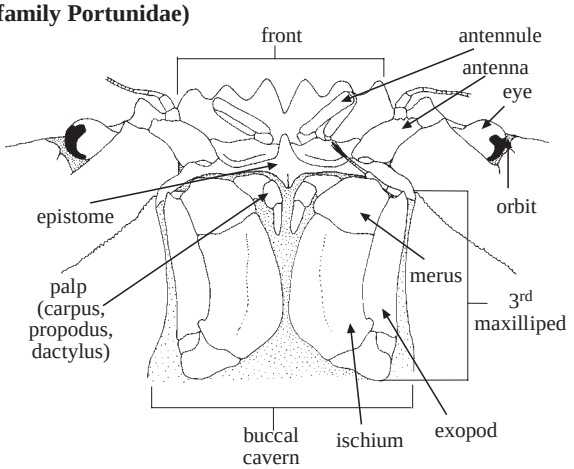
TECHNICAL TERMS AND MEASUREMENTS



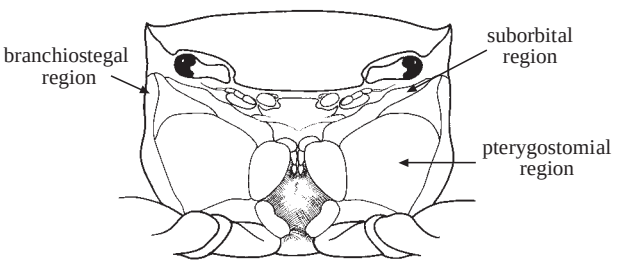
general shape (dorsal view) of a brachyuran crab (family Portunidae)



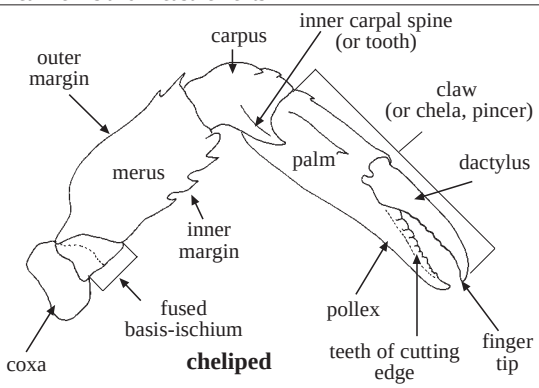
eyes, antennae, and antennules (ventral view)



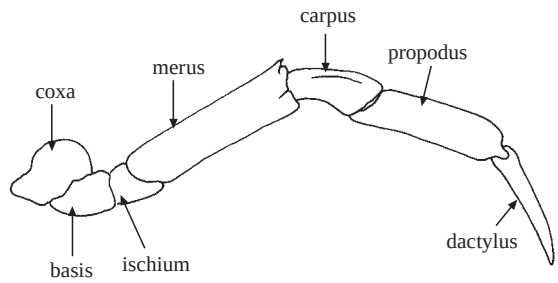
mouth field



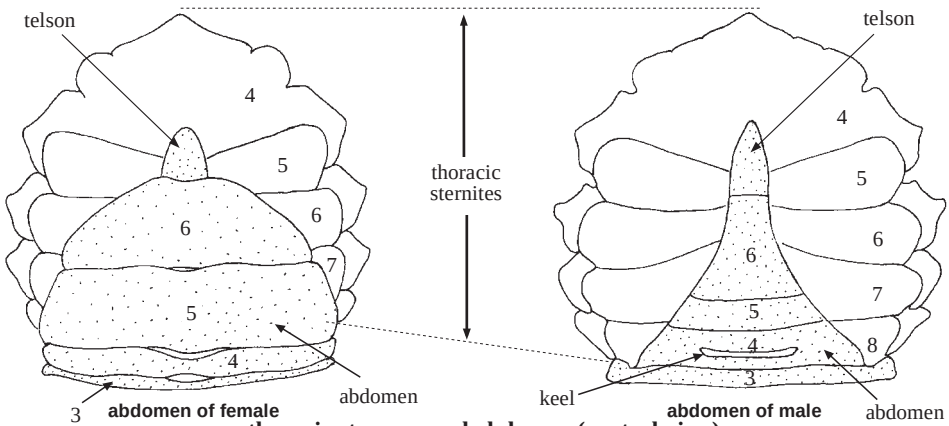
frontal view of body



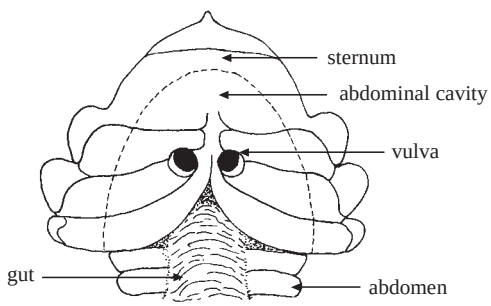
cheliped



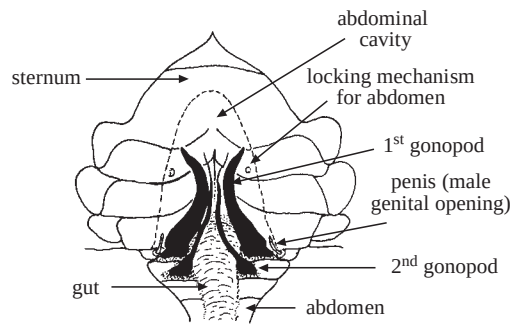
walking leg



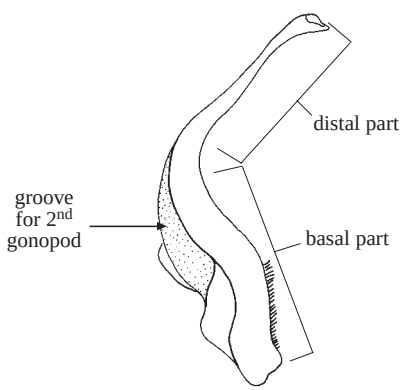
thoracic sternum and abdomen (ventral view)



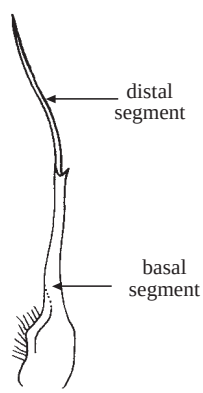
female abdominal cavity and vulvae



male abdominal cavity and gonopods



first gonopod



second gonopod

male gonopods

GENERAL REMARKS

Introduction

Like the shrimps and lobsters, crabs belong to the order Decapoda (= "ten-legged", referring to the 10 thoracic appendages normally present in these crustaceans). Crabs can be classified into 2 main groups, brachyuran crabs (infraorder Brachyura) and anomuran crabs (infraorder Anomura). Most species of Brachyura, or true crabs, can easily be separated from the so-called "false crabs" belonging to the infraorder Anomura by having 4 pairs of well-developed walking legs. Anomuran crabs always have only 3 pairs of walking legs clearly visible, while the fourth (last) pair is very small, normally tucked under the body and hardly noticeable. However, this is just a general rule rather than a distinct separating character as there are a number of true crabs which have their fourth pair of legs greatly reduced as well (e.g. Dynomenidae and Retroplumidae) or even completely reduced (Hexapodidae).

A more recent compilation of the actual number of all species of crabs known to date is pending. The last census was done by Fenner Chace Jr. (1951), who recorded worldwide 4 428 and 1 270 species of brachyuran and anomuran crabs, respectively. The late Raoul Serène (1968) estimated that perhaps some 1 000 species of brachyuran crabs occur in the Indo-Malayan area. However, these numbers have substantially increased over the last 40 years, due to the rapid pace of crab discoveries. It is not unreasonable to believe that the current number of brachyuran and anomuran crabs in the world ranges from 5 000 to 6 000 and 1 500 to 2 000 species, respectively. Of these, the largest proportion is found in the Western Central Pacific, where around 1 500 to 2 000 brachyuran crab species (marine and fresh-water taxa) are probably present.

The present contribution focuses on 15 families of brachyuran crabs and a single family of anomuran crabs which include commercially important species in the Western Central Pacific. The majority of edible crab species belong to the Brachyura, and accordingly, a large number of brachyuran crabs are caught for human consumption in the Western Central Pacific. It is important to note, however, that a much greater number of brachyuran crab species than listed here are collected for food by many poorer communities and indigenous people in the area. Any edible species which are common enough to be collected in great numbers can be eaten, even if they are small in size. To these belong many ocypodids such as soldier crabs (*Dotilla* spp.), fiddler crabs (*Uca* spp.), and periscope crabs (*Macrophtalmus* spp.), but also several medium-sized species of vinegar crabs (Sesarminae, Grapsidae). In addition, many medium-sized species of reef crabs of the families Xanthidae and Eriphiidae are locally consumed among natives of several Pacific islands. However, it is unrealistic to list and discuss every single species that is eaten once in a while or might be collected for food. Therefore, a selection has been made here of those species which at present have a distinct fishery value, are larger and more common, or have a good potential in the future as their fisheries develop. It is also worth noting that several species of fresh-water crabs of the families Potamidae and Parathelphusidae are consumed in many parts of Southeast Asia and Indo-China.

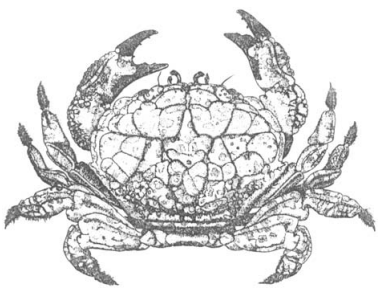
In contrast to the brachyurans, few anomuran crabs have a major fishery value in the Western Central Pacific, with a single species (the "coconut crab", *Birgus latro*) being of distinct commercial importance. The stone crabs (Lithodidae) are represented by several species within the area, but none of them are harvested so far, although some species are utilized for food in other regions of the world (the best known example is the large fishery for the "Alaskan king crab", *Paralithodes camtschaticus*, in the northern Pacific). The lithodid species occurring in the Western Central Pacific, however, are generally too rare to show any significant commercial importance, although it may be possible that a number of species can be utilized in the future. Reports that some large hermit crabs (Paguridae and Diogenidae) are sometimes caught for food are actually not very reliable, and almost certainly none of these show any commercial importance. Many species of land hermit crabs (genus *Coenobita*), however, are regularly collected for the pet trade. The so-called squat lobsters (Anomura: Galatheidae), which actually have a more crab-like than lobster-like appearance, are represented by a few edible species in the Atlantic, but none of the species in the Western Central Pacific are large or common enough to have any food value. The same is true for the deep-water chirostylids (deep-water squat lobsters). However, because of their crab-like shape, galatheids and chirostylids have been included in the present key to families of marine crab-like Anomurans. On the other hand, several anomurans of clearly lobster- or shrimp-like appearance, such as the mud lobsters (*Thalassina* spp., Thalassinidae, notably *T. anomala*) and mud shrimps (*Upogebia* spp., Upogebiidae), are occasionally caught for food in the Western Central Pacific.

Poisonous Crabs

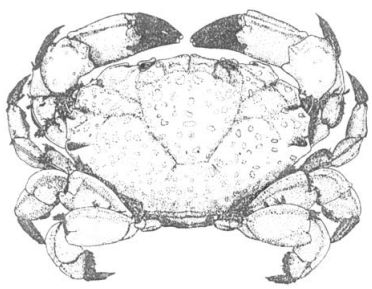
Although poisonous crabs have been known for a very long time, only in recent years have the necessary biochemical studies been done to quantify and qualify the toxins involved. Some people become violently sick after consumption of crabs because of allergic responses, a response not related to poison. In general, there are 2 categories of poisonous crabs:

The **first category** includes the permanent highly toxic species. These crabs are always poisonous, and include taxa such as the "mosaic crab" (*Lophozozymus pictor*), "demon crabs" (*Demania* spp.), "jewel crab" (*Zosimus aeneus*), "crested reef crab" (*Platypodia granulosa*), and "green egg crab" (*Atergatis floridus*). The consumption of any of these crabs, even if well cooked, is extremely dangerous and has proved fatal in several instances. It is important to note here that all these species belong to the family Xanthidae and they all have distinctive colour markings or striking colours, presumably to warn potential predators. All species are of moderately large size, reaching carapace widths from 7 to 10 cm, and as such, may be picked up by fishermen or collectors. The toxins that have been identified include palytoxins, saxitoxins, and tetrotoxins, and occur throughout the tissues and exoskeleton, being most concentrated in the liver and gonads. All these toxins act on the nervous system. As they loose their toxins when kept in captivity and fed on normal food, it is believed that the crabs obtain these toxins directly or indirectly from the food. The 2 most notorious genera are *Lophozozymus* and *Demania*, and a number of human deaths have been attributed to them. Tests on *Lophozozymus pictor* have shown that, although the degree of toxicity varies from individual to individual, they all contain enough toxins to kill an adult human. In a single analysis, 1 g of the crab's flesh contained enough toxins to kill 42 000 mice. A large specimen of *L. pictor*, however, can easily reach a weight of 100 g. This makes it one of the (if not THE) most poisonous crabs known. Not all species of *Lophozozymus* and *Demania* have been analyzed biochemically, but the general consensus is that most, if not all their members are highly toxic.

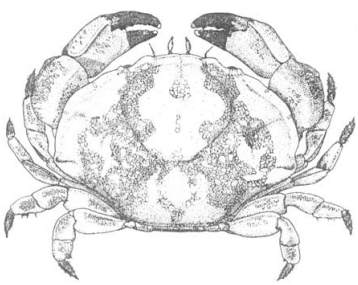
The **second category** of toxic crabs are those which are mildly poisonous and/or occasionally poisonous. The consumption of such crabs may cause illness but rarely death. The species involved here include "reef crabs" (*Carpilius* spp., Carpiliidae), "red-eyed crabs" (*Eriphia* spp., Eriphiidae), coral reef crabs like *Etisus* spp. and *Atergatis* spp. (Xanthidae) and "land crabs" (*Cardisoma* spp., Gecarcinidae). In most instances, these crabs are also not always poisonous, with their toxicity varying with place and time of year. This is very likely to be associated with the food habits of the crabs. In some cases, this is because the crabs have consumed poisonous fruits or leaves (e.g. for land crabs like *Cardisoma*). Poisonous crabs have also been associated with red-tide algal or dinoflagellate blooms. Species like the "red egg crab" (*Atergatis integerrimus*) are probably poisonous because they only occasionally feed on organisms which are toxic and only in small quantities. This second category of poisonous crabs poses problems for fishery officers as a species which is poisonous in one area may be totally harmless in another. Obviously, great care has to be taken in harvesting and consumption of those species.



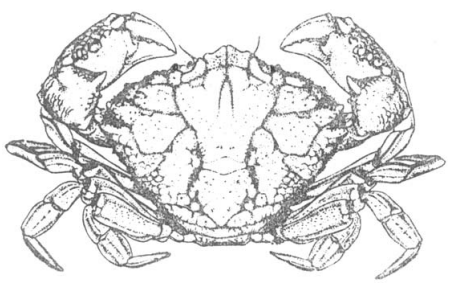
Zosimus aeneus



Lophozozymus pictor

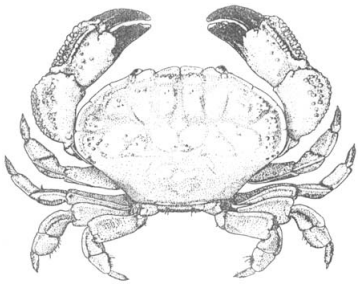


Atergatis floridus

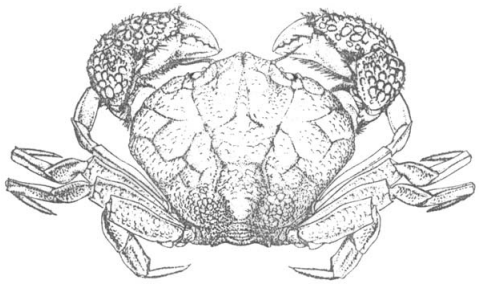


Demania cultripes

(after Garth and Alcala, 1977)



Platypodia granulosa



Demania toxica

(after Garth and Alcala, 1977)

Notes on the classification of brachyurans

The total number of families of Brachyura is still undetermined. Although many authors still follow the classification presented by Balss (1957), more recent studies by Guinot (1978, 1979) have shown that this system is artificial. Unfortunately, not all the brachyuran families currently recognized were dealt with by Guinot in detail and the status of a number of them remains unresolved. For the present report, the writer has essentially adopted Guinot's (1978) system of higher classification. Accordingly, 53 families are recognized, following mainly Guinot (1978) and Manning and Holthuis (1981). Out of these, 8 families are found in fresh water only and thus are outside the scope of the present contribution. Nevertheless, it is relevant to note that out of these 8 fresh-water families, 3 occur in the Western Central Pacific, namely the Potamidae (= Isolapotamidae), Gecarcinucidae, and Parathelphusidae (= Sundathelphusidae) (Ng, 1988). Of the 45 marine families, 40 have been recorded in the Western Central Pacific thus far, with only the Orithyiidae, Thiidae, Cheiragonidae, Pirimelidae, and Platyxanthidae apparently being absent from the area.

Some of the families recognized here have undergone nomenclatural changes. The Eriphiidae has previously been known as the Menippidae and Oziidae. However, Eriphiidae is the oldest name and thus has nomenclatural priority. The Mimilambridae Williams, 1979, is considered a junior synonym of Parthenopidae MacLeay, 1838 (see Ng and Rodriguez, 1986). The recognition of a separate family for the Eumedonidae, symbionts on echinoderms, follows Stevcic et al. (1988). Stevcic (1988) recognized a separate family, Cheiragonidae, for crabs previously classified in the Telmessinae (Atelecylidae). Finally, the Camptandriidae, previously considered to be a subfamily of the Ocypodidae, is regarded here as a separate family, following the suggestions of Harminto and Ng (1991).

Characters useful for identification

The teeth of the **anterolateral margins** of the **carapace** are also known as the epibranchial teeth. The **first anterolateral tooth** is often called the "external orbital" or "exo-orbital" angle (or tooth) and is counted separately from the following **anterolateral teeth** by many authors (but not here). The **frontal margin** (or **front)** becomes elongate and/or spiniform in many crabs such as the homolids (deep-water porter crabs) and majids (spider crabs), and is then frequently called a **rostrum**.

The maximum **carapace width** is used as principal measurement indicating the size of a crab, measured as the greatest distance between the lateral margins of the carapace.

The **buccal cavern** (location of the mouthparts), is bordered on both sides by the **pterygostomial regions**, and above by the **epistome**. The calcareous plate inside the buccal cavern is called the **endostome**. Usually, only the anterior part of the endostome is visible, even when the mouthparts are moved aside. The outer mouth parts or **third maxillipeds** are often just referred to as **"the mouthparts"**, even though there are actually 6 pairs of feeding appendages. Underneath the third maxillipeds, the **second maxillipeds** and **first maxillipeds** are located, normally covered by the third maxillipeds in life. Two smaller feeding appendages are situated below the 3 pairs of maxillipeds: the first maxilla (or maxilla) and second maxilla (or maxillules). Finally, the mouth is bordered by a pair of well-calcified, jaw-like, and highly modified appendages, the **mandibles**.

The 5 pairs of locomotory appendages of a crab (the pereiopods) are made up of a pair of usually powerful **chelipeds** (legs carrying a **chela** or **pincer**) and normally of 4 pairs of **walking** (or ambulatory) **legs**. For the present contribution, the first appendage is referred to as the **cheliped** and the last 4 appendages (walking legs) as **legs**. The claw (or chela) itself consists of a **palm** (or manus) and 2 **fingers**, one of which is movable (the **dactylus** or **movable finger**), whereas the other one (**pollex**) is fixed. The tips or edges of the fingers may be **pectinated**. In some families the last pair or all walking legs are modified for swimming or burrowing, as seen in the Portunidae and the Matutinae (the latter a subfamily of the Calappidae).

Adult male and female crabs are easily distinguished by the shape of their **abdomen**. In males, the abdomen is triangular to broadly T-shaped, whereas in females it is broad, usually semicircular, often covering most part of the ventral surface. Almost all crabs have 7 **abdominal segments** (although the seventh segment or **telson** is actually not a true segment), but in a number of families, several segments are partially or completely fused. This fusion may be complete (i.e. with the sutures between segments no longer visible) or incomplete (i.e. with parts of the sutures still present or obscure). In both cases, however, the segments are immovable.

Many crab species show a sexual dimorphism, with the males usually being larger or possessing special or excessively developed structures. In some species, however, it is the female which grows larger. Males possess **2 pairs** of **gonopods**, that is, modified pleopods specifically adapted for copulation (most crabs practice internal fertilization). The pleopods (abdominal appendages) of females are branched, setose and serve to carry the eggs: fertilized eggs are exuded, attached to the setose pleopods of females, and kept there for several weeks until the planktonic larvae (zoeae) hatch out. The larvae pass several stages before they finally metamorphose to a young crab.

Many species of crabs possess **pubescence** to varying degrees on their body and appendages. The hair (or more appropriately called **setae**) may be soft or stiff, simple or plumose (plume-like), or so short that it becomes pile-like, sometimes even short and dense, giving a velvet-like appearance. The setae may sometimes be hard and spine-like, especially on the propodus and dactylus of legs. Unlike real spines, however, those stiff setae are never calcareous. Majids often possess hook-like setae that attach to sponges, algae, and debris (similar in action to velcro), supporting the camouflage of the crab. In other species, the longer and/or plumose setae gather dirt and mud in order to obscure the animal's outline. Most of the softer setae on the legs and chelae have a sensory function.

Carapace types

The shape of the carapace is often used as a descriptive character in many guides and keys. Unfortunately, a large variety of terms have been introduced in the past, not always applied with exactly the same meaning. Therefore, an approximate categorization has been attempted here and those carapace types which belong to a respective category are illustrated below. It should be remembered, however, that there are sometimes no clear lines separating the different carapace types, and so the designation of a particular type may be somewhat subjective in certain cases. Nevertheless, the use of carapace shapes is still a useful character in many instances.

The carapace types utilized here are shown in Figures A to N.

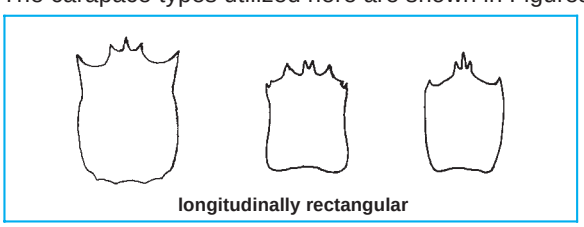
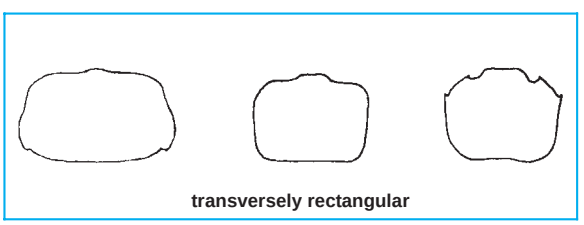


Figure A



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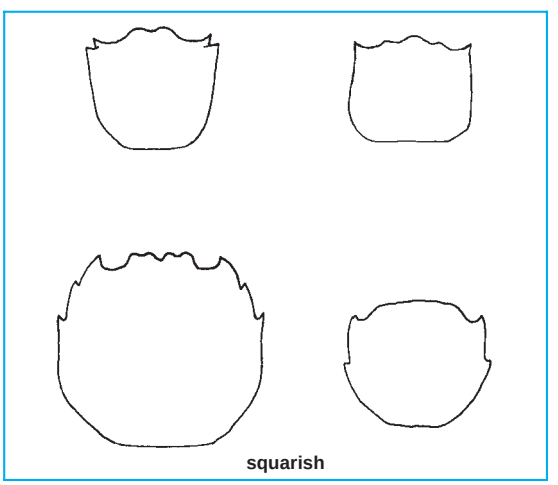

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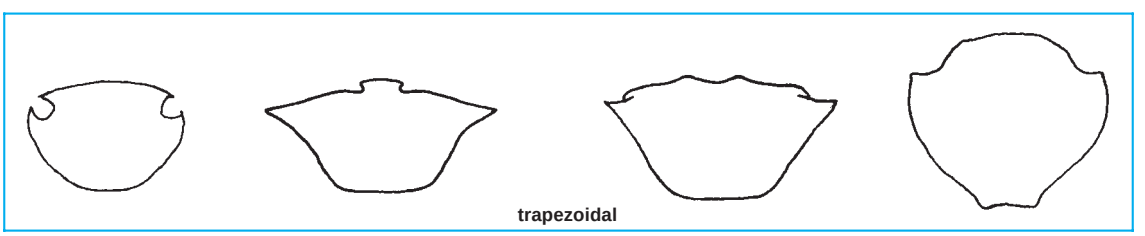

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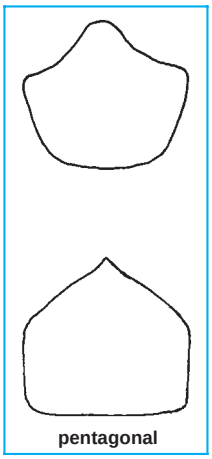

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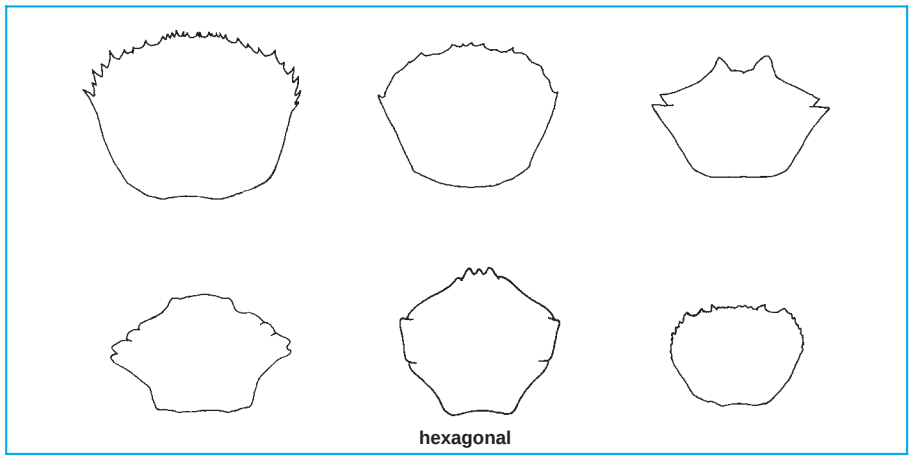

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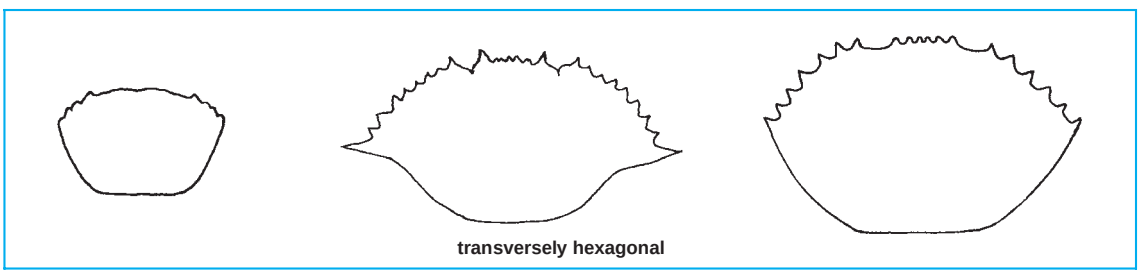

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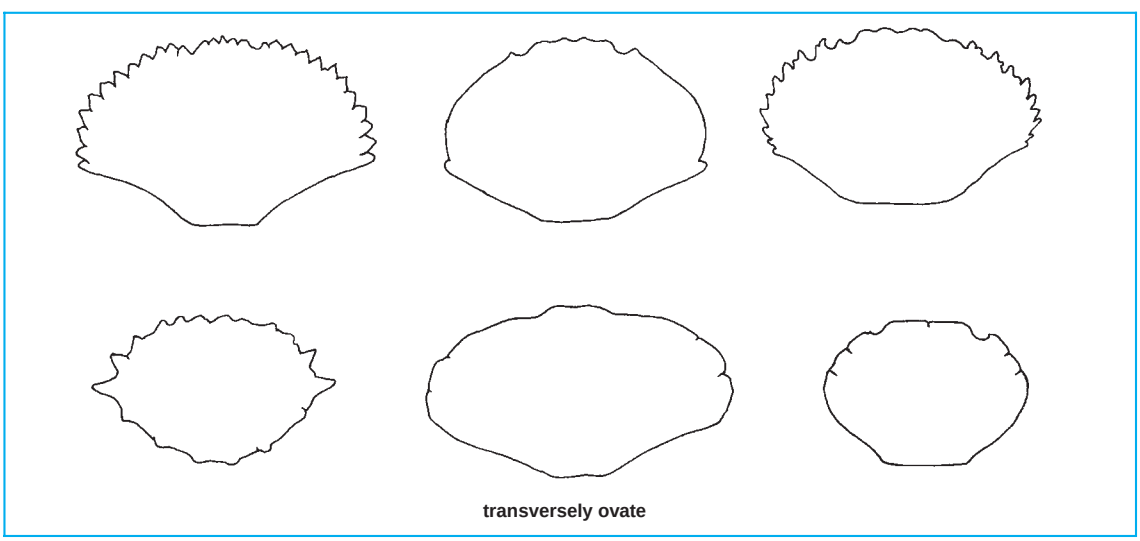

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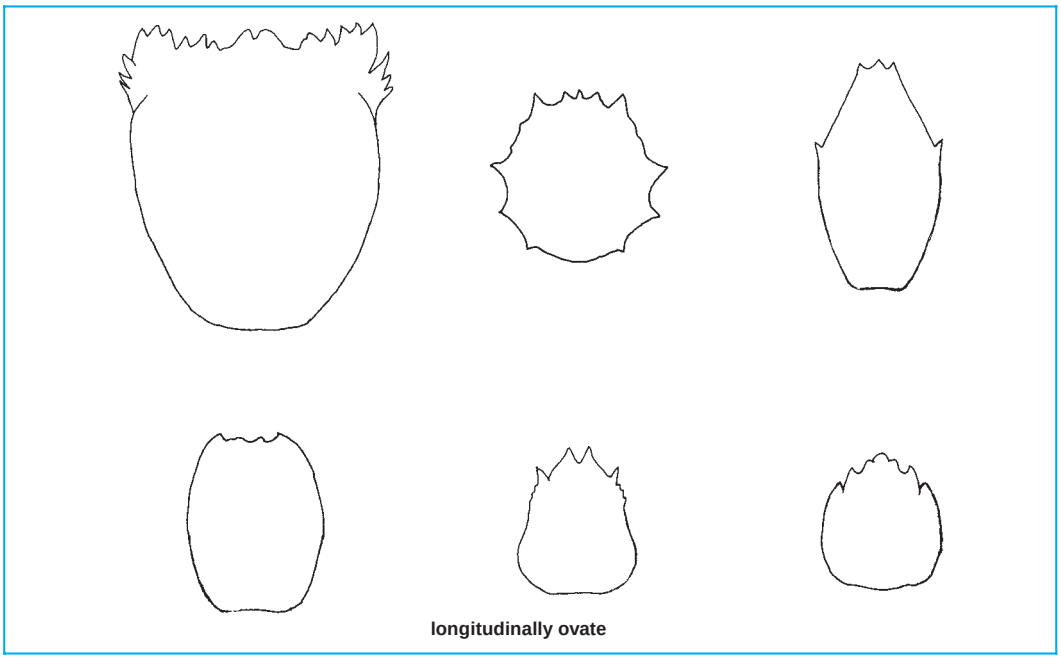


Figure I

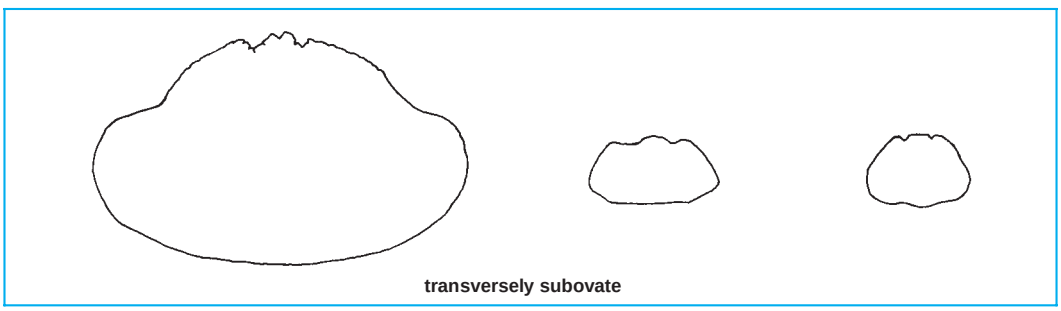
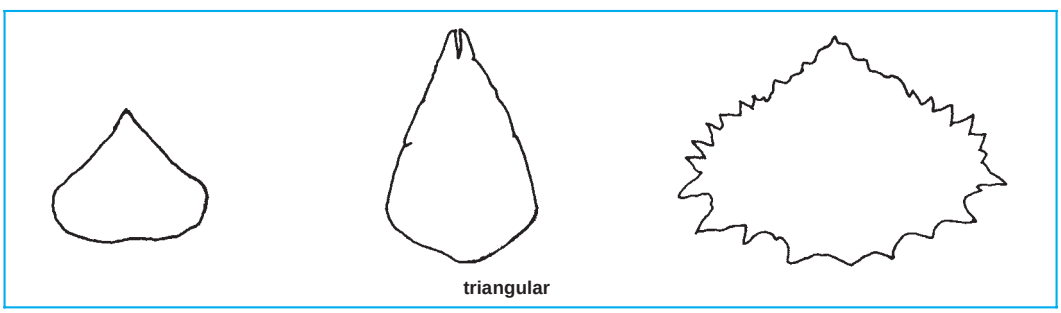


Figure J



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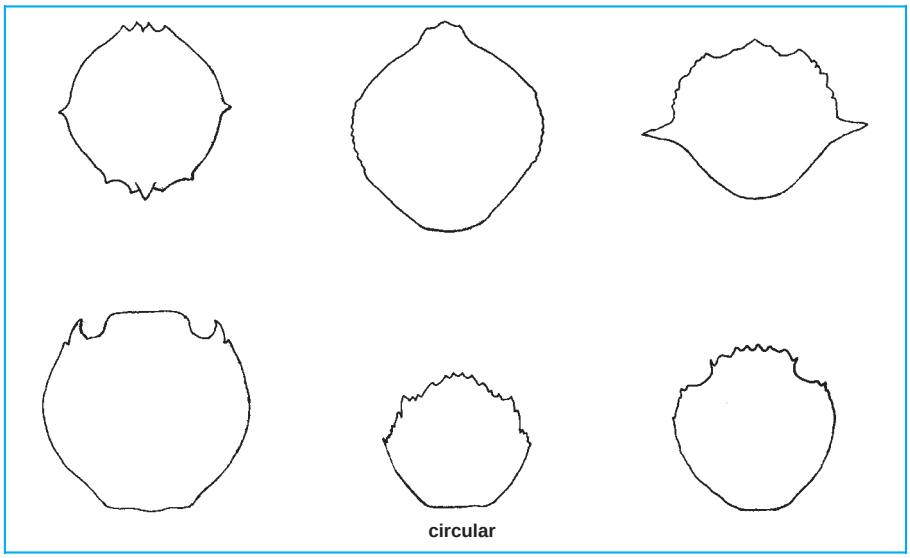


Figure L

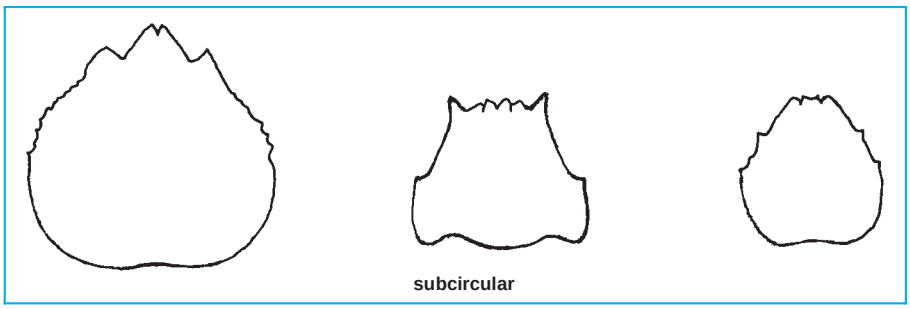


Figure M

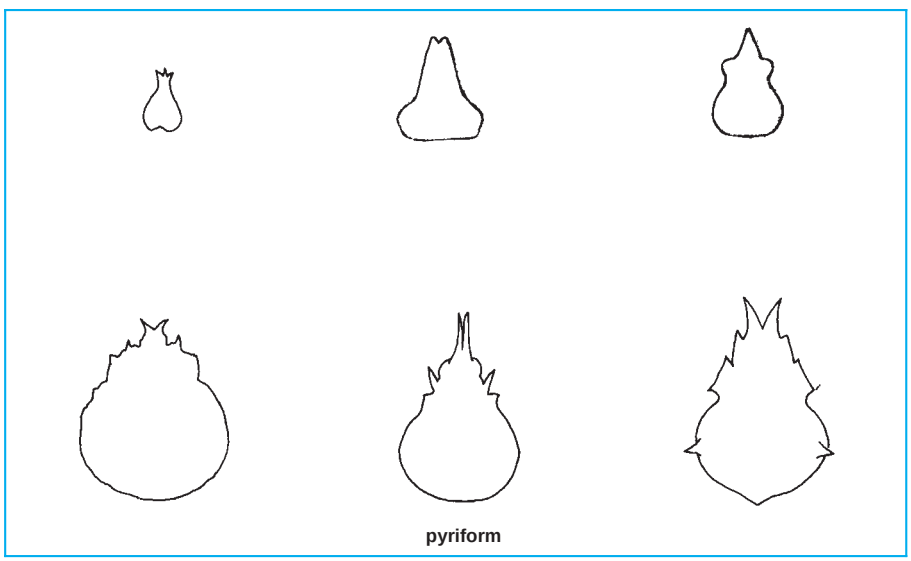
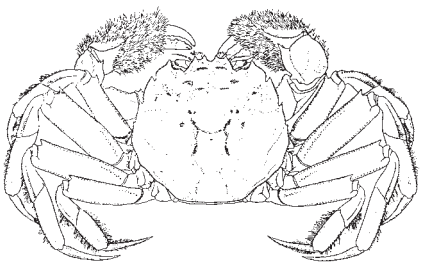


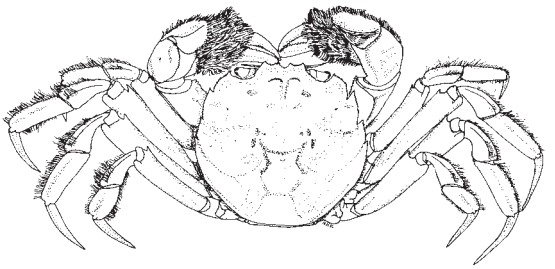
Figure N

IMPORTED CRABS OF COMMERCIAL IMPORTANCE

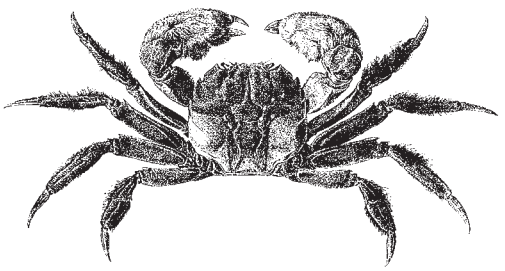
Several species of non-Western Central Pacific crabs are regularly imported into the area, notably to Singapore, Malaysia, and Thailand. They command very high market values and are popular not only among locals but also the relatively large expatriate community (especially Japanese) in these countries. In most cases, they are brought in alive for better value and for the live-seafood restaurant trade. Therefore, one would probably frequently encounter these species in markets or retailers. The main species imported are "Chinese mitten or hairy crabs" (*Eriocheir sinensis*, *E. hepuensis*), "Japanese mitten crab" (*E. japonicus*), "giant Tasmanian crab" (*Pseudocarcinus gigas*), "snow crab" (*Chionoecetes opilio* and *C. japonicus*), "queen crab" (*Erimacrus isenbeckii*), and "Alaskan king crab" (*Paralithodes camtschaticus*).



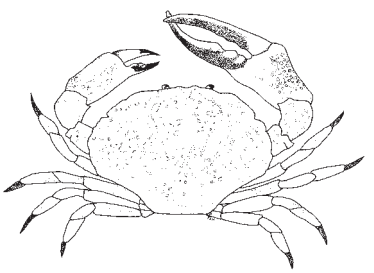
Eriocheir sinensis
(from Shen, 1932)



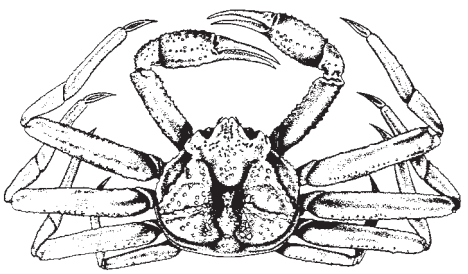
Eriocheir hepuensis



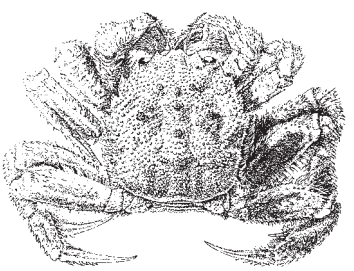
Eriocheir japonicus
(from De Haan, 1833)



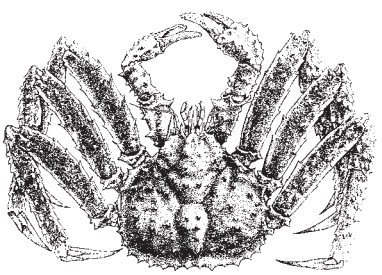
Pseudocarcinus gigas



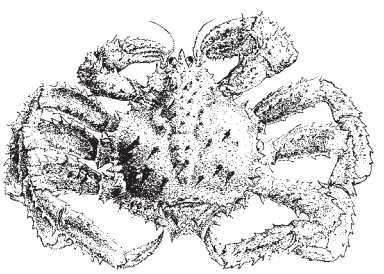
Chionoecetes opilio
(after Kobyakowa, 1955)



Erimacrus isenbeckii
(after Kobyakowa, 1955)



***Paralithodes camtschaticus* (male)**



***Paralithodes camtschaticus* (female)**

(after Kobyakowa, 1955)