MANGROVE ESTUARY CRABS OF THE MIMIKA REGION - PAPUA, INDONESIA

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OF THE MIMIKA REGION - PAPUA, INDONESIA

DWI LISTYO RAHAYU
GESANG SETYADI

THE 6TH BOOK IN A SERIES OF FIELD GUIDES TO THE FLORA AND FAUNA OF MIMIKA REGION, PAPUA

Mangrove Estuary Crabs

of the Mimika Region
Papua, Indonesia

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Cover Illustrations: Perisesarma foresti Rahayu & Davie, 2002, inset; mangrove habitat in the Ajkwa Estuary, Mimika.

Foreword

I am proud to welcome the Mangrove Estuary Crabs of the Mimika Region book. This book is an important supplement to our continuous efforts in Corporate Social Responsibilities, in specific to the environment and education, and is the seventh book of biodiversity published by PT Freeport Indonesia.

PT Freeport Indonesia, in more than 40 years of its operations in Papua, finds itself located at one of the most exotic and unique environment in the world. The island is one of the most biologically diverse mangrove estuary ecosystems and its 1.75 million hectares of mangrove vegetation is the largest in Indonesia. A large number of crabs inhabit this mangrove estuary ecosystem with only a few have been published.

Our mangrove estuary ecosystem monitoring efforts since 1996 have identified over 250 species of fish, 300 species of invertebrates, and 20 species of mangroves. Other monitoring efforts in alpine, sub alpine, rainforest, and swamps ecosystems have also record high numbers of varieties of flora and fauna.

Realizing these facts, we strongly encourage and support efforts related to cultivation of knowledge and promotion of Papua to external parties. In addition, PT Freeport Indonesia also actively looks for breakthrough ideas in rehabilitating the environment, such as the tree planting program for visitors in our operational areas.

We believe the combination of knowledge and execution will be able to help preserve and rehabilitate the environment we live in. I would like to congratulate all contributors for making this book a reality and hope the book will bring benefit to people interested in exploring biodiversity in Papua.

Armando Mahler
President Director and CEO
PT Freeport Indonesia

Crabs habitat in mangrove forest in Mimika

Acknowledgment

This project is supported by PT Freeport Indonesia. Thanks due to Wisnu Susetyo, former Vice President for Environmental Department of PT Freeport Indonesia and Andi Mukhsia, Manager of Environmental Department. Thanks also go to the staffs from Coastal and Marine Section Agung Darmawan, Abdul Haris, Deky Lala, and Amiruddin for assisting in sample collections and photographs. During their ecological study of mangrove crab in Mimika region, Arif Pratiwi and Irni Ermayanti from Diponegoro University collected some species to add in this book. Joe Garison, Rudhi Pribadi, Daisy Wowor and Sigit Dwiono allowed us to use their photographs.

Special thanks go to K.G. Hortle, former Superintendent for Coastal and Marine Section of Environmental Department of PT Freeport Indonesia for giving the idea to make a field guide book for crabs of the Mimika region and to Johnny Prewitt and Jim Dellinger for reviewing this book. Thanks also to Arif Adiwisastra for his help to convert the documents to a print-ready format.

We are most grateful to Peter K.L.Ng from National University of Singapore and Christoph D. Schubart from Universität Bielefeld, Germany for sparing their valuable time to help in preliminary identification of mangrove crabs from Mimika region; Peter Davie from Queensland Museum, Brisbane, Australia assisted in identifying the difficult species.

Content

Mud Crab *(Scylla olivacea)*, the biggest crab in the Mangrove ecosystem of Mimika

Introduction

Crustaceans are easily recognized by the horny or chitinous covering of the body and by their division externally into somites or segments, some of which have jointed appendages. They are greatly diverse in regards to body shape, size and life style. The number of crustaceans is estimated more than 60,000 species worldwide and found in all habitats, including terrestrial, freshwater (lakes and rivers), estuarine, intertidal mangrove and seagrass communities, shallow coral reef, and deep sea.

Crustaceans such as shrimps and crabs are popular foods for human consumption; ecologically they are important as food resource for fish and other predators, as well as being major consumers and predator themselves. Crustacean larvae form a large component of plankton and are essential for the food chain of fishes.

Papua province, Indonesia (formerly Netherland New Guinea or Irian Jaya) is situated in the western side of the island of New Guinea. The northern coast faces the Pacific Ocean, protected by several small islands and coral reefs. The southern coast is shallow, facing the Arafura Sea, its shoreline entirely covered by dense mangrove forest. In the western part of Papua, the mangrove forest is interrupted by small areas of sand and coral reef.

Crustaceans Decapoda, mostly freshwater, of Papua has been intensively collected and studied in late nineteenth century until mid twentieth century (Holthuis, 1982). However, information on marine and estuarine crustacean decapoda is limited, and mostly from the northern region of Papua (Nobili, 1905; Tesch, 1917; Rathbun, 1926; Roux, 1927) and eastern part of New Guinea (Ball and Haig, 1972; Morgan, 1988). Only recently have the crustaceans from southwest coast of Papua been studied (Rahayu, 2002; Rahayu & Takeda, 2000; Rahayu & Davie, 2002, 2006; Rahayu& Hortle, 2002; Rahayu & Ng, 2002, 2003a, b, 2004, 2005).

Coverage of the book

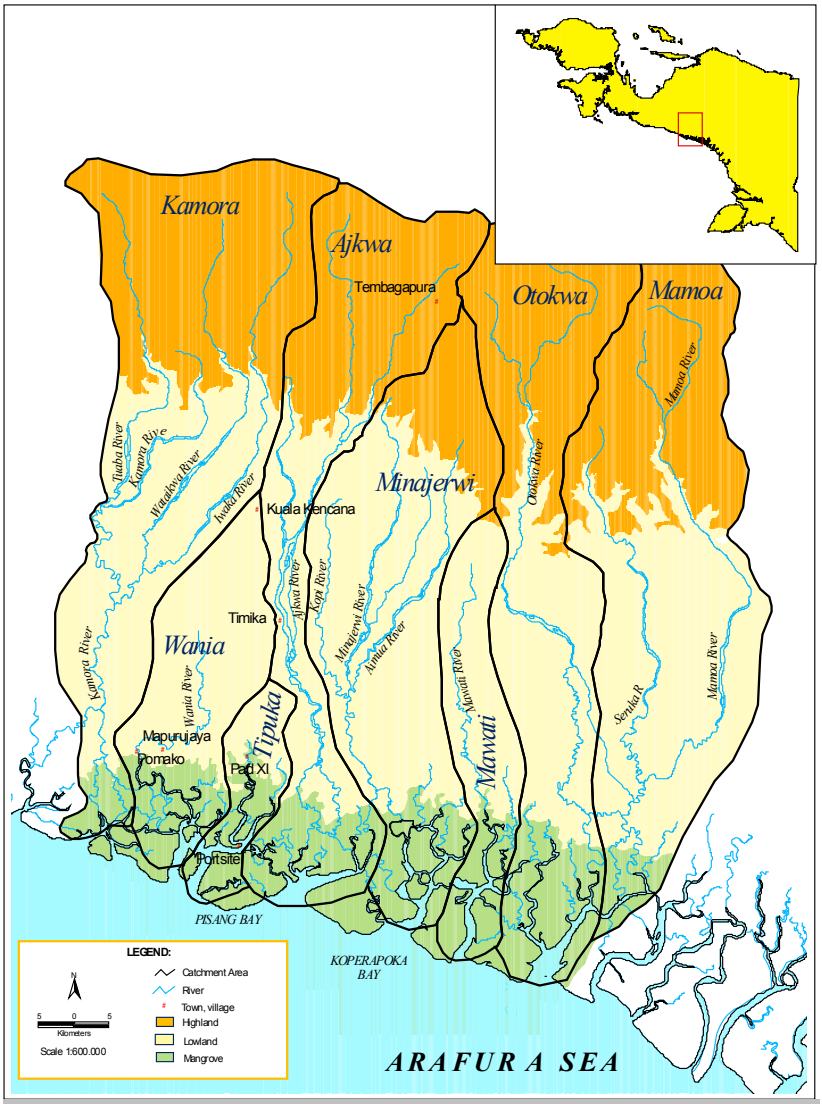
This book is designed as a guide to crabs identification (crustaceans, decapods) of the Mimika region in the south coast of Papua. For the purpose of this book, the Mimika region is defined as the area between the Kamora and Otakwa Rivers on the southern coast of Papua (04º40'-05º05'S; 136º35'-137º20'E).

Hermit Crab *(Clibanarius longitarsus)*

Being at four degree south of the equator, this area has a tropical climate with high humidity and abundant rainfall throughout the year. The seascapes of Mimika region are dominated by vast and dense mangrove forest. About a dozen rivers flow down to its coast. Receiving fresh water from all these rivers, the river sediments fertilize the mangrove forest and providing nutrient for the plants and animals living in it. The sediments also augment the mud in intertidal areas forming small islands of mangrove in the river mouth. High tides can go 15 km upstream; therefore, mangroves are still present at this distance inland.

Mangrove forest of Tipuka Estuary

Crustaceans and molluscs are the most conspicuous animal in the mangrove ecosystem. This book is limited to crabs found in the rivers along the mangrove forest, in the mangrove forest, and in the estuaries and river mouths. This book may be useful for carcinologist, students or amateur naturalist to assist in quick field identification; it is also designed to provide information on biological aspects and distribution of crustaceans.



Map of mangrove forest in Mimika region with major river catchment

Estuary Ecosystem of the Mimika region

An estuary is a partially enclosed body of water where saltwater from the sea mixes with freshwater from rivers. The freshwater of four estuaries of the six estuaries covered in this book originate in the Jayawijaya mountains. Those estuaries are Kamora, Ajkwa, Minajerwi and Otakwa Estuaries. The two other, Tipuka and Mawati Estuaries originate from lowland rivers. The high mountain rivers are generally turbid, reaching 2,000 mg/L of Total Suspended Solid, especially during high rainfall events. Rainfall, which can exceed 11,000 mm/year in some areas, combined with high topographic mountains causes a significant amount of erosion which is deposited in the estuary mouth extending out into the Arafura Sea.

The width of estuary mouths varies from 1 – 4 km wide with a depth ranging from 3 – 15 m. The flow varies substantially in response to the daily tide patterns; with an extreme tide range of 3.4 m. The flow is considerably strong during a falling tide.

Ajkwa estuary mouth

Mangrove of the Mimika region

Papua has the largest area of mangrove vegetation in Indonesia, covering an area of 17,500 km2 (1.75 million hectares). Mangrove forest in the estuaries of Mimika region cover an area of approximately 250,000 hectares, distributed along 200 km of coast line. The average depth of the mangrove forest is approximately 15 km inland from the coastline.

New mangrove island during low tide

The mangrove ecosystem in Mimika region is dominated by a *Bruguiera gymnorhiza – Rhizopora apiculata* association. Five major communities identified were: *Avicennia – Sonneratia* colonization on the mud and sand banks; *Rhizophora, Bruguiera*, and *Nypa* forest; and mixed forest on the freshwater margins (Ellison, 1997). Mangrove monitoring in the Mimika Region in 2001 and 2004 found 18 and 20 species of mangrove, respectively. The most dominant species was *Rhizopora apiculata*. Some minor species which were also found in the area include *Ceriops decandra, Callophyllum soulattri,*

and *Bruguiera stylosa*. The average density of mangrove is 464 tree/hectare with an average basal area of 31 m2/ha (Setyadi et al., 2001).

According to Pribadi (pers.comm), primary productivity of mangrove forests in the Mimika Region, based on the annual litter is around 12.7 ton/ha/year. These litter rates are higher than recorded at any other location in Indonesia, including Bintuni Bay (11.1 ton/ha/year) and Matang Forest (12 ton/ha/year).

The high natural sedimentation rate in the region results in the rapid development of new land. After 3 to 5 years, these newly formed lands are rapidly colonized by mangrove, dominated by *Sonneratia alba* and *Avicennia marina* becoming mature within 10 years when other species such as *Rhizopora apiculata* are more dominant. In the upper estuary, transition occurs from *Bruguiera gymnorhiza – Rhizopora apiculata* association to *Nypa* forest or mixed forest associated with *Sonneratia casseolaris* (Apple mangrove).

Mature Mangrove Forest in the Kamora

Morphology of Crustaceans

Crustaceans belong to the phylum Arthropoda which includes insect, spider, scorpion, millipedes and centipedes. Crustaceans are characterized by the presence of a rigid, calcium carbonate based external skeleton, a segmented body and jointed limbs. The chitinous external skeleton on the upper half of the anterior segments is often fused into a particularly hard shell (carapace), which can be produced forwards into a pointed rostrum. The bodies of crustaceans are divided into three parts: head, thorax and abdomen, each with similar sometimes fused segments. The head has two pairs of sensory appendages (antennae and antennule) and three main pairs of feeding appendages (mandible, maxillule and maxilla); the head may also have additional structures including: rostrum, eyes, labrum and labrium, epistome and pairs of maxillipedes. The thorax and abdomen have pairs of appendages, used for walking, climbing or swimming. At the posterior end of the body there is a tail often with uropod and telson.

Mud Lobster (*Thalassina anomala*) at Pasir Hitam, Ajkwa Estuary

Higher taxa such as decapod crustaceans have eight pairs of thoracic appendages. Three pairs are modified as maxillipeds to assist the mandible and maxilla in the feeding process; and the remaining five pairs are typically walking legs. Often one or more pairs of walking legs ends in a claw which is used for catching or picking up food.

As crustaceans grow, they discard their hard chitinous skeleton and replace it with a new one. This molting occurs periodically in the crustaceans life cycle. Before the old cuticle is shed, the animal forms a new, soft cuticle inside the old one and calcium carbonate from the old cuticle is partly absorbed and digested to be used to harden the new cut. When the old cuticle is shed, the animal absorbs water, swelling the soft, flexible new cuticle to make space for future growth.

Sexes are always separated in decapods. Eggs generally are carried by the female on the underside of the abdominal. The habits of decapod crustaceans are as various as their species. Some are strictly flesh-eater, some subsist entirely on plants and some are omnivorous or detritivorous

Crustacea of the Mimika Region

The majority of crustaceans encountered in the river, mangrove and estuarine environments are known as decapods (10 legs). Shrimps and crabs are all prominent members of this group. Crabs can be classified into two groups, brachyuran and anomuran crabs. Brachyuran or true crab is easily separated from anomuran or false crab in having four pairs of well developed walking legs and lack of an obvious tail sections. Anomurans are distinguished by a clearly evident tail section and a reduction in the last pair of thoracic appendages.

This book covers 103 species of crabs inhabiting the mangrove estuary environment in the Mimika region. Two main families of crabs are Ocypodidae, which typically lives on the lower shore, close to the estuary, and the family Sesarmidae that being able to withstand dryer environments, live on the upper shore, very often climbing root and trunk of the mangrove trees.

Collecting and preserving Crustacean

Crustaceans can be caught by several methods such as drop net, trawl (for commercial uses), trap net or hand picking. The crabs treated in this book were collected by hand, seine and trawl. After catching, the crabs were wrapped in a plastic bag and placed in a freezer, or put in a box containing ice. When the crabs are dead, they are preserved in a fixative solution. A 70-75% solution of ethanol in water is an effective fixative for most crustaceans. However, larger crustaceans can be fixed in 5 – 10 % solution of formaldehyde in water; after 1 week the specimens are washed in fresh water and placed in a 70-75% solution of ethanol in water. About 10 milligrams of glycerin per liter of ethanol will ensure that the leg joints remain flexible.

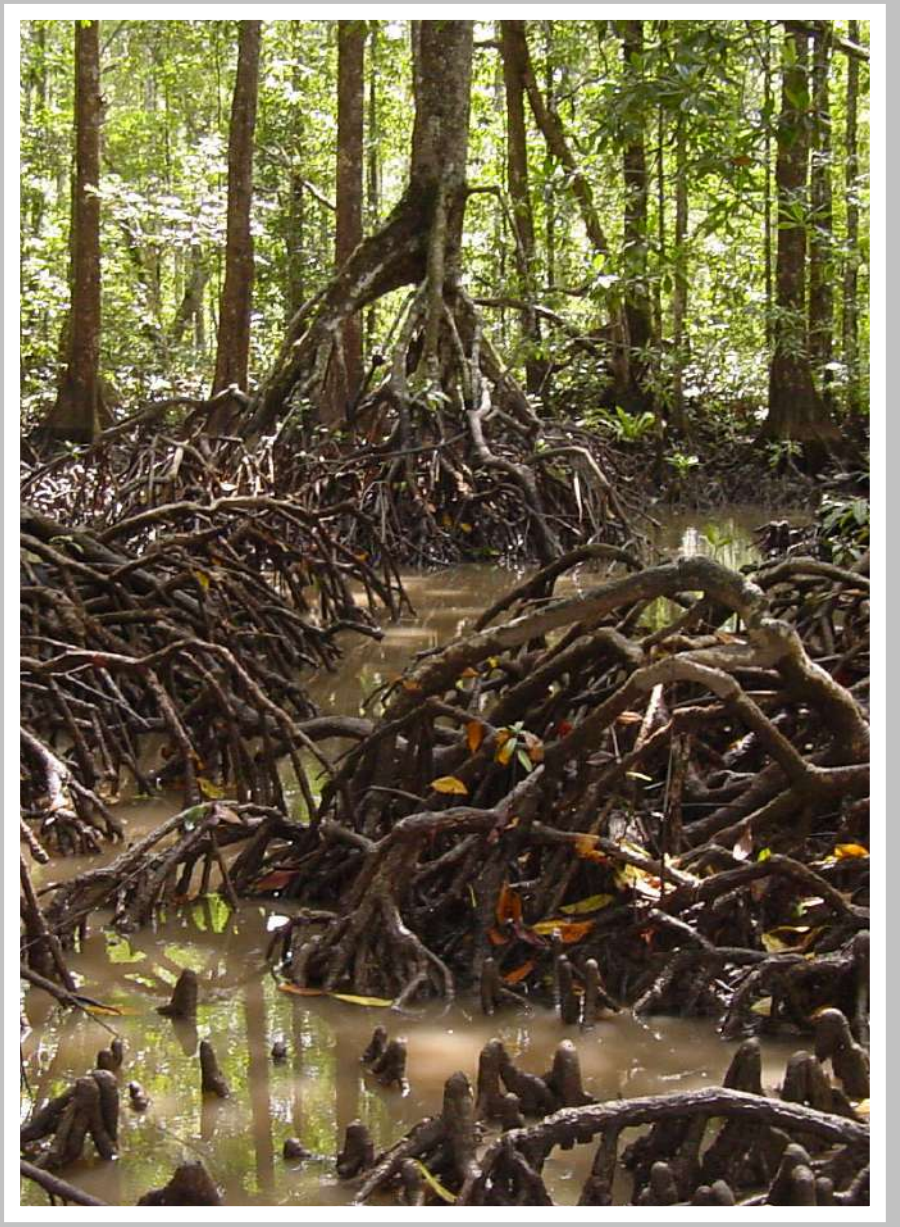
Fiddler Crab (*Uca* sp) at Kamora Estuary

Format and presentation

This book is designed as an illustrated identification and reference guide, and is organized according to the biological (scientific) classification system. Animals are classified in a hierarchical system; the highest category in regular use is Phylum following by Class, Order, Family, Genus and the lowest category is Species. In its classification, crustaceans have many secondary divisions such as subclass, infraorder, superfamily and subfamily. Some of these secondary divisions such as infraorder, superfamily and subgenus, will be used in this book as they refer to major and easily recognizable group of crustaceans. Classification of crustacean in this book follows Ng et al (2007).

Family sections include an introduction containing general characteristics, habitat, distribution, and an estimation of total number of genera and species. The common (if any) and Latin names are given at the beginning of each family. An identification key to superfamily (if any) and to genera (if there is more than one genus) is given for each family, when appropriate.

The placement of infraorder, and superfamily are arranged alphabetically. The placement of family within the superfamily, and genera within each family follows the key of its superfamilies/families, while for the species the placement is arranged alphabetically within each generic section. Those placements do not mean to suggest phylogenetic relationships. The scientific name and common name (if any) are given for each species. The scientific name (written in italic) is followed by the name of the person who described the crustacean and the year of publication. If the name appears in parentheses, this signifies that the species was first assigned to a genus different from the present one. The common names used are the English name. Individual species text contains a brief account of diagnostic features (presented in telegraphic format), a color description, size, habitat, and distribution. The size of crab is the maximum carapace width ever, of each species collected in the Mimika region. For Anomura and Thalassinidea the size is based on the length of shield, measured from the tip of rostrum to the midpoint of the posterior margin of the shield. While for Brachyuran crabs, the size is based on the carapace breadth at the widest point. Photographs of each species were taken when animal was alive, after being killed in the freezer or shortly after preservation in ethanol or formaldehyde.



Aerial root of mangrove

Infraorder Anomura

The infraorder Anomura present the greatest diversity in body form. They varied from elongated, shrimp-like to short, crab-like body with abdomen tucked under the cephalothorax. The abdomen is frequently membranous or only weakly calcified, even for the animal with crab-like form, the abdomen is relatively soft and membranous or is covered by individual calcified plates. The eyes are stalked, compound and generally well developed. The antennules are pedunculate with three segments while the antennae have five, possibly, six or fewer segments with the exopod usually reduced to acicle. The first pair of pereopods is usually chelate; the second pair is only occasionally chelate. Fourth and fifth pairs of pereopods are usually chelate or subchelate, one or both are frequently reduced. The appendages of the abdomen are rarely well developed, often they are reduced or present only in one side. The sex in adult can be distinguished by the presence of gonopore on coxae of the third pereopod of female and on the fifth pereopod of male. The first and second pleopods are often modified as gonopods in both sexes; female sometimes has abdominal brood pouch and male sometimes have sexual tube(s).

The anomurans are marine inhabitant, with few semiterrestrial and freshwater species. Hermit crabs (Superfamily Paguroidea) and porcelain crabs (Superfamily Galathoidea) represent the infraorder Anomura in the Mimika Region.

Superfamily Galathoidea
Family Porcellanidae - Porcelain crab

Porcelain crab, named for the smooth colorful carapace, is an anomuran decapoda crustacean with very short last pair of walking legs. Chelipeds are large and flattened and abdomen is folded closely under the thorax. Antennae are very long but not very hairy. Third maxillipeds are large, with long and dense setae. The color is variable depending on the species and habitat. In the mangrove and sandy mud habitat the color is usually brown, greenish brown or cream. The animal can grow up to 2.5 cm, but usually they are smaller.

Porcellanid crabs are common in marine habitat, usually occur beneath rock on rocky shore or coral reef, some species occur in mangrove area. It is a filter feeder, straining plankton from the water with their feathery third maxillipeds during high tide. The family contains 16 genera and comprises hundreds of species worldwide. At present there are four known species of mangrove porcellanid crab and only one species, *Petrolisthes kranjiensis*, is found in the Mimika region.

Petrolisthes kranjiensis Johnson, 1950

Diagnosis: Carapace longer than broad, smooth, relatively flat dorsally, front rather broad, sinuously triangular. Ocular peduncles moderately large, short. Third maxillipeds robust, ischium broad, merus with laminate lobe mesially; flagella with long and dense setae. Chelipeds equal or subequal; moderately flattened. Meri short, dorsal surface transversely rugose; carpi more than twice as long as broad, dorsal margin with 2 spines distally, mesial margin with proximal spine, dorsal surface with numerous short striae. Surface of palms with numerous short striae; cutting edges of fingers with short and dense setae. Pereopods moderately short; dactyls with 4 spines on posterior margin; meri of first and second pereopods with prominent posterodistal spines.

Color: In general dark brown or greenish brown with yellowish white markings.

Size: Maximum recorded carapace width 10 mm.

Habitat: Under wood trunk or among dead wood or between crevices in mangrove area.

Distribution: Singapore, Malaysia and Australia.

Superfamily Paguroidea
Family Diogenidae - Hermit crab

Hermit crab is a decapod anomuran crustacean, characterized by soft, elongate abdomen and reduction of the last two pairs of walking legs, which are much smaller than the other legs. To protect their soft abdomen, hermit crabs use gastropods shell as shelter and when the animals grow, they acquire a bigger shell. Hermit crabs can be carnivorous or scavenger, engage also in feeding on detritus. Diogenidae is one of the hermit crab families found in the Mimika region. This family has worldwide distribution with 20 genera and 410 species, occurring from intertidal pools to deep waters in tropical and temperate seas.

Diagnostic characters for the family Diogenidae include an elongated shield with rostrum triangular or straight; rostrum is shorter or longer than lateral teeth. Third maxillipeds are close at base (no gape between third maxilliped). Abdomen is well developed, soft, asymmetrical and coiled in adaptation to the spiral curve of the gastropod shell. Chelipeds are equal, subequal or unequal, the left being much larger than the right or very rarely the right slightly bigger. Second and third pereopods are long and stout, functioning as organ of locomotion; fourth and fifth pereopods are reduced. Dactyl of the fifth pereopod is almost always chelate while the fourth pereopod is subchelate (occasionally chelate). Telson is short or long, posterior margin rounded or squarish with or without median incision, with or without corneous teeth.

Two genera of *Diogenidae, Clibanarius* and *Diogenes*, are found in mangrove and estuarine area in the Mimika region. *Clibanarius* is essentially littoral; in this area the species of this genus were common on mud or sandy mud substrate, some species were found in brackish water on mudflat along a river during low tide in mangrove area. *Diogenes* were found more in estuarine area close to river mouth, some species were collected from off shore up to 40 meters.

Key to the genus of Diogenidae in the Mimika region:

- Chelipeds equal or subequal, fingers spooned, fingers tip corneous. Antennal flagella long and not setose. No movable spine (intercalary rostral process) between ocular acicle ..... *Clibanarius*

- Chelipeds unequal, left much larger than right, fingers tip calcareous. Antennal flagella setose. Movable spine (intercalary rostral process) present between ocular acicle ..... *Diogenes*

Clibanarius longitarsus at Ajkwa Island

Clibanarius ambonensis Rahayu & Forest, 1992

Diagnosis: Shield almost as long as broad. Ocular peduncles stout, corneas inflated, diameter approximately 0.2 length of peduncles. Antennal peduncles not reaching base of corneas; antennular peduncles exceeding base of corneas. Chelipeds subequal, palms covered with tubercles, stronger and denser on mesial margin. Second and third pereopods moderately long, dactyls about as long as propodi; carpi with 1 distal spine on dorsal margin.

Color: In general bluish brown; ambulatory legs with brown longitudinal stripes; lateral surface of dactyls and meri with 3 stripes, propodi with 4 stripes, carpi with 2 stripes; ocular peduncles with very thin brown longitudinal stripe on dorsal surface.

Size: Maximum recorded shield length 4 mm,

Habitat: Mud or sandy mud substrate in estuarine and mangrove area near mouth of river.

Distribution: Maluku, Papua, and Okinawa, Japan.

Clibanarius antennatus Rahayu & Forest, 1992

Diagnosis: Shield longer than broad. Ocular peduncles stout, corneas inflated, diameter approximately 0.3 length of peduncles. Ocular acicles with 3-4 terminal spines. Antennal and antennular peduncles exceeding base of corneas; antennal peduncles large; antennal acicles short, reaching half of fourth segment of antennal peduncles. Chelipeds sub-equal, right slightly larger; palms covered by conical, dark tipped corneous tubercles, stronger and denser on dorsal margin. Second and third pereopods long and slender, dactyls strongly arched, much longer than propodi.

Color: Color in general bluish brown; ocular peduncles bluish white with interrupted longitudinal brown stripe on dorsal surface; ambulatory legs light blue or bluish white with brown longitudinal stripes: meri with 1 stripe; carpi with 3 stripes; propodi with 4 stripes; dactyls with 2 interrupted stripes.

Size: Maximum recorded shield length 3.5 mm.

Habitat: Muddy or sandy-mud substrate along river banks in the mangrove area.

Distribution: Found in south Sulawesi and south coast of Papua, Indonesia

Clibanarius harisi Rahayu, 2003

Diagnosis: Shield slightly longer than broad. Ocular peduncles long and slender, 0.8 length of shield; corneas small, 0.2 length of ocular peduncles. Ocular acicles small, triangular, terminating in 2 spines. Antennal peduncles hardly reaching base of cornea, antennular peduncles longer than ocular peduncles. Chelipeds sub-equal, left slightly larger, covered with blunt tubercles, scarcely setose; meri with strong spine on mesioventral margin. Second and third pereopods slender, dactyls longer than propodi; lateral face of dactyls with longitudinal grooves.

Color: In general greenish brown. Ocular peduncles with 2 longitudinal brown stripes on dorsal surface. In small specimen pereopods red orange. In alcohol the greenish brown color becomes bright red.

Size: Maximum recorded shield length 11 mm.

Habitat: Muddy substrate in mangrove forest near mouth of river; bigger specimens were caught by trawl in estuary from 7 meter depth.

Distribution: South coast of Papua, Indonesia.

Clibanarius longitarsus (De Haan, 1849)

Diagnosis: Shield longer than broad; ocular peduncles long, corneas small, diameter approximately 0.2 length of peduncles. Ocular acicles small, with 2-3 terminal spines. Antennal peduncles reaching base of cornea; antennular peduncles longer than ocular peduncles. Chelipeds subequal, left slightly larger, covered with corneous tipped tubercles. Second and third pereopods long and slender with scattered short setae, dactyls longer than propodi.

Color: In general greenish-brown; second and third pereopods with median longitudinal blue stripe bordered by light brown line from dactyls to carpi, on meri this stripe is more or less fading. Large orange stripe above and under this blue stripe. This color is very contrast with the dark muddy substrate where the animal live.

Size: Maximum recorded shield length about 12 mm.

Habitat: Estuary and mangrove forest on muddy substrate. The species is often found feeding on propagule of mangrove and young leaves.

Distribution: Widely distributed in the Indo West Pacific from the Red Sea and Indian Ocean to Japan and North of Australia.

Diogenes avarus Heller, 1865

Diagnosis: Shield longer than broad with few short transverse spinulose ridge. Ocular peduncles shorter than antennal and antennular peduncles; ocular acicles broad, with 1-3 strong spines and several minute spines on terminal margin. Intercalary rostral process slender, shorter than ocular acicles. Antennal peduncles with long flagella and setae. Left cheliped elongated in bigger male, outer surface covered with blunt and pointed tubercles, palm with strong longitudinal ridge medially. Second and third pereopods slender, dactyls weakly arched, propodi and carpi with several spines on dorsal margin. Telson asymmetrical, left lobe with large marginal spines, right lobe with smaller spines.

Color: Carapace and chelipeds mottled white and brown, ambulatory legs light brown, with large brown band on each article of ambulatory legs.

Size: Maximum recorded shield length 3.5 mm.

Habitat: Sandy mud or mudflat in the mangrove close to mouth of river.

Distribution: From Indian Ocean to the Malay Archipelago and northeast coast of Australia.

Diogenes dorotheae Morgan & Forest, 1991

Diagnosis: Shield approximately as broad as long. Ocular peduncles 0.7 length of shield, slightly inflated distally and proximally, reaching base of ultimate segment of antennular peduncles, slightly shorter than antennal peduncles. Intercalary rostral process simple, slightly shorter than ocular acicles. Antennal acicles not quite reaching half length of penultimate segment of antennal peduncles, with 3 moderately large spines; antennal flagella longer with long slightly plumose setae. Palm of left cheliped convexe, row of 4 large spines on outer surface starting from proximoventral angle of propodus, larger spines proximally, upper margin with several tubercles. Second and third pereopods long and slender, dorsal margin of carpi with row of large spines. Telson asymmetrical, left lobe much larger than right, armed with large spines on posterior margin. Photo: preserved specimen.

Color: Unknown

Size: Maximum recorded shield length 2 mm.

Habitat: Muddy substrate of estuarine area to about 40 m.

Distribution: Cape Bossut, Northwestern Australia and south coast of Papua, Indonesia.

Diogenes dubius (Herbst, 1804)

Diagnosis: Shield slightly broader than long. Ocular peduncles stout, inflated proximally, much shorter than antennal and antennular peduncles. Intercalary rostral process longer than ocular acicles, spinulous along its margin. Antennal acicles strongly spinous, bifurcate, longer branch reaches base of fifth segment of antennal peduncle. Outer surface of palm of left cheliped with sparse tubercles; upper margin of dactyl, palm and carpus with rows of tubercles. Propodi of second and third pereopods covered with small tubercles; dactyls weakly arched, longitudinal groove on lateral surface. Telson with large spines on posterior margin of left lobe, right lobe with smaller spines. Photo: preserved specimen.

Color: In general creamy white, palm and dactyl of left cheliped red-orange; ocular peduncles with 2 brown longitudinal stripe on dorsal surface.

Size: Maximum recorded shield length 5 mm.

Habitat: Sandy-mud substrate in estuarine area and off shore to about 10-15 meters depth.

Distribution: Indian Ocean, Malay Archipelago and southeast Australia.

Diogenes foresti Rahayu & Hortle, 2002

Diagnosis: Shield slightly longer than broad, dorsal surface with numerous spinules. Ocular peduncles stout, shorter than antennal and antennular peduncles; inflated basally, cornea dilated. Intercalary rostral process small, slightly shorter than ocular acicles. Antennal acicles reaching distal end of fourth peduncular segment; antennal flagella long, with dense setae. Left cheliped covered by small pointed tubercles. Right cheliped with large hiatus between fingers, scarcely tuberculate. Second and third pereopods long and slender; dactyls arched, about 1.5 length of propodi; carpi with distal spine on dorsal margin. Left lobe of telson with several large marginal spines, right lobe with smaller spines.

Color: In general light brown mottled with dark brown.

Size: Maximum recorded shield length 2 mm.

Habitat: Muddy substrate of estuarine area, 10-40 m.

Distribution: Southwest coast of Papua.

Diogenes leptocerus Forest, 1956

Diagnosis: Shield longer than broad, dorsal surface with small tubercles and tufts of long setae. Ocular peduncles stout, intercalary rostral process entire, same length as ocular acicles. Antennal peduncles shorter than ocular peduncles, with long flagella and setae; antennular peduncles longer than ocular peduncles. Left cheliped with upper margin of dactyl, palm and carpus with row of spines; outer surface of palm with longitudinal row of spines medially. Second and third pereopods slender, carpi with 1 distal spine on dorsal margin. Telson without incision, posterior margin truncate, armed with small, transparent spines.

Color: In general mottled brown and white.

Size: Maximum recorded shield length 3.5 mm.

Habitat: Muddy-sand substrate of mangrove and estuarine area.

Distribution: Vietnam, Balikpapan (east Kalimantan), Indonesia.

Diogenes jousseaumei (Bouvier, 1897)

Diagnosis: Shield almost as broad as long. Ocular peduncles reaching beyond base of ultimate segment of antennular peduncle; antennal peduncles exceeding ocular peduncles but not reaching half length ultimate segment of antennular peduncles. Ocular acicles triangular with 3-5 distal spines. Intercalary rostral process very small, vestigial. Antennal flagella long with short and long simple setae; antennal acicles short with 3-4 strong terminal spines. Chelipeds and ambulatory legs covered by long and dense setae, obscuring features, especially on dactyls and propodi. Telson asymmetrical, left lobe larger than right and armed with small and large spines.

Color: In general whitish cream. Carpi and meri of chelipeds and ambulatory legs mottled dark brown and white. Ocular peduncles with 2 longitudinal brown stripes on dorsal surface.

Size: Maximum recorded shield length 4 mm.

Habitat: Muddy substrate offshore waters, 5-14 m depth.

Distribution: Red Sea, Andaman Sea, Singapore, Indonesia, and Queensland and Northern Territory, Australia.

Diogenes tumidus Rahayu & Forest, 1995

Diagnosis: Shield longer than broad; lateral margin with large spines. Ocular peduncles slender, corneas slightly inflated. Antennular peduncles slender, slightly exceeding ocular peduncles. Antennal peduncles short, 0.6 length of ocular peduncles; antennal flagella short with short setae. Left cheliped strongly spinulose on upper margin of palm, carpus and ventral margin of merus; palm covered with small spines, median longitudinal row of spine on outer surface of palm. Dactyl of right cheliped long and stout, forming large hiatus with fixed finger, row of 2 or 3 spines on dorsal surface of dactyl proximally. Moderately dense setae on chelipeds and ambulatory legs.

Color: Shield mottled white and brown. Dorsal surface of ocular peduncles mottled white and brown bordered by fine longitudinal red line from base of ocular peduncles to base of cornea. Chelipeds and ambulatory legs light brown to dark brown speckled with white.

Size: Maximum recorded shield length 3.5 mm.

Habitat: Muddy or sandy mud substrate near mangrove area.

Distribution: Phuket, Thailand; Singapore and Indonesia.

Infraorder Brachyura

Infraorder Brachyura comprises the true crabs, mostly marine inhabitant; rarely occurring in freshwater or semi terrestrial. Cephalothorax is short and broad; abdomen is much reduced in size and closely bent under the thorax. Eyes are stalked, compound and often retracting partially or completely into socket or depression in the carapace. The antennules are pedunculate, they can be folded back in the socket, and the flagella are sometimes reduced or vestigial. Antennae are pedunculate and usually without exopod, flagella are short, sometimes absent. The third pair of maxilliped, which is flat and plate-like, covers the mouthparts. The five pairs of pereopods are well developed, first pair has strong chelae, the other pairs are fitted for walking; certain forms have the last segment of the fifth pair paddle-like, used for swimming. The appendages of abdomen are reduced; in the male they consist of two pairs used for sperm transfer and in the female they consist of four pairs modified for the attachment of the eggs.

In adult animals, sexes can be readily distinguished by the shape of abdomen; in male the abdomen is narrow, fitting in a groove on the underside of the cephalothorax; in female it is very broad, often covering the entire surface of the underside between the paired legs.

The infraorder Brachyura in the Mimika region is represented by several genera and species of the families Calappidae, Camptandridae, Dorippidae, Dotillidae, Grapsidae, Hymenosomatidae, Leucosidae, Matutidae, Macrophthalmidae, Menippidae, Ocypodidae, Oziidae, Pilumnidae, Portunidae and Sesarmidae.

Superfamily Calappoidea

The superfamily Calappoidea comprises two families Calappidae and Matutidae. Each family is represented by one species in the Mimika region.

Key to the superfamily Calappoidea from Mimika Region

- Carapace circular, ovate to transversely ovate or subovate; sides of carapace may be expanded toward side and back, to form wing-like expansion which covers at least part of ambulatory legs. Ambulatory legs smooth, laterally flattened but never paddle-like ..... Calappidae
- Carapace circular to ovate; sides of carapace with long spine on junction of antero- and posterolateral margins. Ambulatory legs distinctly flattened laterally; last two segments of all legs paddle-like ..... Matutidae

Family Calappidae - Box Crabs

The family Calappidae has circular, ovate to transversely ovate and subovate carapace, frontal margin is triangular and narrow; sides of the carapace may be expanded toward the side and the back, to form wing-like expansion which cover at least part of the walking legs. The edges of these expansions are usually scalloped or spiny, they can also be smooth. Meri of the third maxillipeds is distinctly triangular. There is opening for afferent respiratory current at the base of the chela and canal is not present along sides of the buccal cavern. The claws are flattened from side to side and held close to the front body; the upper surface of the palm has a distinct crest. The larger chela has a special tooth at base of fixed finger for cutting gastropod shells which are their main foods. Ambulatory legs are smooth, laterally flattened but never paddle-like. Male abdominal segments 3 to 5 are completely fused.

The name box crabs is deserved because of the species of the genus Calappa that can hide their claw and legs under the carapace, therefore it appears to be box-like. The family Calappidae has eight genera and 78 species distributed worldwide, burrows on soft substrate in intertidal area, some species live in the deep sea, up to 200 m. In the Mimika region one species, *Calappa philargius* was collected from estuarine area.

Calappa philargius (Linnaeus, 1758)

Diagnosis: Carapace narrowly oval, with strongly arched lateral margin; dorsal surface strongly convex in both direction, smooth, with pair of submedian longitudinal wide furrow and some linear furrow along each lateral margin. Lateral margin with serrated teeth; wing-like expansion at posterior end of carapace well developed, cut into 4 teeth. Posterior border of carapace armed with 7 strong teeth. Chelipeds strong; dorsal margin of palm with large teeth. Photo: preserved specimen.

Color: This species is characterized by dark colored rounded spot on palm and carpus of the cheliped and dark colored band around the orbit.

Size: Maximum recorded carapace width 10 mm.

Habitat: Sand, muddy-sand or broken shell bottom, subtidal zone to 120 m.

Distribution: Indo-West Pacific from Red Sea, to east coast and southeast coast of Asia; Japan, Indonesia, Australia and Samoa.

Family Matutidae - Moon Crabs

The family Matutidae (moon crabs) is characterized by circular to ovate carapace with smooth or granulose surface, usually there is a long spine on the junction of antero and posterolateral margins of carapace; front is narrow and antennae are rudimentary. The third maxillipeds are elongated, completely covering buccal cavern and concealing palp when folded. Chelipeds are subequal, outer and upper faces of palm variously armed with spines, lobes, or crest. Ambulatory legs are distinctly flattened laterally; the last two segments of all legs are paddle-like. Male abdomen has five segments. Of four genera and 15 species in the family Matutidae, three genera and 14 species are distributed in the Indo West Pacific, burrows on soft sandy substrate in intertidal area to about 60 m. In Mimika region one species was found.

Matuta planipes from Tipuka Estuary

Matuta planipes Fabricius, 1798

Diagnosis: Carapace surface nutely granulate; front with straight horizontal lobes laterally and slightly emarginate rostrum medially. Ischium of third maxilliped tuberculate. Anterolateral margins uniformly crenulate; lateral spine long, 0.2 carapace width. Carpus of cheliped with two obtuse tubercles on outer surface, upper margin carinate, granulate, inner angle produced. Upper margin of palm with 3 teeth, proximal tooth tuberculate, upper surface with 2 rows of low granulate tubercles. Palm with 1 ridge medially, extended to tip of lower finger, proximally with granulates tubercle followed by prominent, acuminate spine.

Color: Carapace brownish yellow with reticulating dark brown lines forming small rings.

Size: Maximum recorded carapace width 50 mm.

Habitat: Sandy substrate in estuarine water near mangrove area from 0 to 14 m.

Distribution: India, Malaysia, China, Japan, Indonesia, New Guinea and Australia.

Superfamily Dorippoidea

The superfamily Dorippoidae contain two families, Dorippidae and Ethusidae and only family Dorippidae was found in the Mimika region.

Family Dorippidae - Porter crabs

The family Dorippidae is very often called porter crab because most of the crabs of this family are carrying objects on their back for camouflage. It has subcircular or longitudinally ovate carapace, widest posteriorly. Antennules and antennals are large; antennules are folded obliquely. Third maxillipeds are not covering the large anterior part of buccal cavern, meri are triangular. Afferent branchial opening are narrow and situated ahead of the bases of the chelipeds. Chelipeds are equal or unequal, robust; second and third pereopods are long, fourth and fifth pairs are reduced, subchelate, turned upward, used for carrying an object on its back such as leaves, pieces of shell, or tunicates.

Nine genera and 21 species of Dorippidae are widespread in the Indo-West Pacific. In the Mimika region one species, *Neodorippe simplex* is found in estuarine area near mangrove. This crab carries leaf and swims upside down when disturbed.

Neodorippe simplex from Tipuka Estuary

Neodorippe simplex Ng & Rahayu, 2002

Diagnosis: Dorsal surface of carapace smooth, almost flat, regions well defined. Front with 2 well developed teeth; anterolateral margin gently sinuous. Chelipeds unequal, one much larger than other. Large chela with palm prominently swollen, surface smooth, dorsal margin with scattered short setae, fingers much shorter than palm. Second and third pereopods long, dorsal and ventral margins of dactyls and propodi with long and dense setae. Fourth and fifth pereopods reduced, subchelate. Male abdomen short, third to fifth segments fused, immovable. Female chelipeds equal, abdomen rounded with all segments free.

Color: Carapace light brown, chelipeds cream.

Size: Maximum recorded carapace width 16 mm.

Habitat: Estuarine area near mangrove forest.

Distribution: South coast of Papua, Indonesia

Superfamily Eriphioidea
Stone and mud crabs

The superfamily Eriphioidea is characterized by the hexagonal, transversely rectangular or transversely ovate carapace with heterochelous and relatively short chelae, the larger chela has a crushing or peeling tooth at the base of the dactyl, and the smaller chela has slender fingers of varying length but never with a crushing tooth, the walking legs are moderately long. Abdominal segments of male are distinct and movable, relatively broad to very broad.

This superfamily contains five families with 64 species. It has worldwide distribution, lives in shallow to deep sea in various habitats such as coral reef, rocky shore or on muddy sand substrate in mangrove area. In the Mimika region only two families, Menippidae (Stone Crab), with one species *Myomenippe fornasinii* and Oziidae (Mud Crab) with one species, *Epixanthus dentatus*, were found. These two crabs have powerful claws to crush mollusk for food; they hide in burrows, under rock or driftwood; its dark brown coloration made difficult to be spotted in their natural habitation.

Key to the superfamily of Eriphioidea from Mimika region:

- Carapace transversely ovate; slightly convex dorsally. Larger chelae with prominent molariform to peg-like tooth; anterior thoracic sternum transversely broad without longitudinal groove on sternite 4; male abdomen relatively narrow with lateral margin converging towards telson; distal part of G2 tapers gradually to sharp tip ..... *Oziidae*
- Carapace xanthoid-shaped, broad and dorsally flattened. Larger chelae with prominent molariform tooth; anterior thoracic sternum longitudinally broad with prominent longitudinal groove on sternite 4; male abdomen relatively broad with lateral margin more or less subparallel;distal part of G2 tapers abruptly just before end with terminal part filiform ..... *Menippidae*

Epixanthus dentatus (White, 1847)

Diagnosis: Carapace transversely ovate; surface smooth posteriorly, anteriorly granulate. Frontal margin cut into 4 lobes, largely spaced. Anterolateral margin with 5 teeth including exorbital angle, first to third teeth truncate or rounded, large; fourth tooth longer than fifth. Chelipeds unequal; outer surface near upper margin of palm of large cheliped with large tubercles, upper margin with large teeth; cutting edges of fingers with molariform teeth; large gape between fingers. Fingers of small cheliped long and slim, longer than palm, tips crossing each other, no gape between fingers.

Color: Carapace surface dark brown with light brown or yellow spots pattern.

Size: Maximum recorded carapace width 100 mm.

Habitat: Mangrove, usually hide in crevices or under rock and wood trunk.

Distribution: Widely distributed in the Indo-West Pacific.

Myomenippe fornasinii (Bianconi, 1851)

Diagnosis: Carapace transversely ovate, surface smooth except minute tubercles near anterolateral margin. Frontal margin cut into small teeth; median teeth largest. Anterolateral margin with 4 teeth including orbital angle, second and third teeth large, fourth teeth acute. Chelipeds unequal, smooth; fixed finger of large cheliped with short median furrow from tip of finger to mid length of palm; outer surface of dactyl with short furrow; cutting edges with molariform teeth. Small cheliped same form as large cheliped.

Color: In general dark brown almost black; fingers of both chelipeds black.

Size: Maximum recorded carapace width 100 mm.

Habitat: Rocky shore with muddy-sand substrate and in mangrove, under rock or trunk or in crevices.

Distribution: Part of Indian Ocean and northern Australia.

Superfamily Grapsoidea

Grapsoid crabs are easily recognized by the broad-fronted, square or circular carapace shape and often have a flattened appearance. The last pair of walking legs is not flattened for swimming but is adapted for climbing and running over rock, sand and mud. Superfamily Grapsoidea includes swimming, climbing or terrestrial crabs with majority of species occurring in intertidal areas or semi-terrestrial habitat; common inhabitant of rocky shore and mangrove, agile, they hide in crevises, under rock or wood trunk. Currently seven families are included in the superfamily Grapsoidea with 53 genera and 441 species

In the Mimika region, this superfamily is represented by 3 families (Sesarmidae, Grapsidae and Varunidae) with 17 genera and 24 species.

Key to the Superfamily Grapsoidea from Mimika region (modified from Ng, 1998).

1 • No distinct rhomboidal gap between third maxillipeds; carapace subquadrate to rounded; frontal margin entire, without lobes or teeth; third maxilliped with broad exopod and long flagellum; male abdomen with all segment movable .....Varunidae

• Distinct rhomboidal gap between third maxillipeds 2

2 • Meri and ischia of third maxillipeds with ridge; pterygostomial region with network-like (reticulated) pattern of very short, stiff setae; carapace usually squarish .....Sesarmidae

• Meri and ischia of third maxillipeds without hairy oblique ridge; pterygostomial region may be setose but not network-like (reticulated) pattern discernible; carapace usually circular .....Grapsidae

Family Varunidae

Family Varunidae has subquadrate to rounded carapace with mostly smooth and moderately convex dorsal surface. The front is entire and moderately deflexed, sometimes sublaminar, without lobes or teeth. The anterolateral margins are convex, usually with two or less, well-defined epibranchial lobes behind truncate exorbital angle. Third maxillipeds without distinct rhomboidal gap when closed; meri and ischia without an oblique setose ridge; meri with antero-external angle sometimes strongly produced and auriculate; the exopods are narrow or widened, broader than ischium, and have long flagella. Male abdomen has seven free segments; usually not covering thoracic sternum between last pair of legs.

This family includes six subfamilies, 35 genera and 112 species distributed in the world ocean, intertidally to deep sea. In the Mimika region four genera, each represented by one species, are found in mangrove and estuarine areas.

Key to the genera of the family Varunidae in the Mimika region:

1 • Exognath of third maxilliped broader than ischium 2
• Exognath of third maxilliped narrower than ischium..... 3
2 • Carapace flattened, dactyls of pereopods 2-5 not flattened .....*Ptychognatus*
• Carapace convex, meri of pereopods 2-5 with spine on posterior border .... *Parapixydognathus*
3 • Merus of third maxilliped auriculate at outer anterolateral angle. Pereopods 2-5 flattened..... *Varuna*
• Merus of third maxilliped not expanded at outer anterolateral angle. Pereopods 2-5 not flattened.....*Utica*

Ptychognathus dentatus De Man, 1892

Diagnosis: Carapace slightly broader than long, surface smooth, flattened but not particularly depressed; regions distinct. Front prominent, nearly straight. Lateral margin with 2 sharp anterolateral teeth behind sharp and broad exorbital angle. Meri of third maxillipeds slightly shorter than ischia, external distal angle prolonged transversely outward. Exognath oval with smooth and strongly convex surface, more than twice as broad as ischium. Chelipeds equal and stout; dorsal surface of palms glabrous, longitudinal ridge paralel to lower margin, from tip of fixed fingers to midlength of propodi; ventral surface with thick hairs; inner angle of carpi with small spine. Ambulatory legs flattened, anterior margin of dactyls, propodi, carpi and meri fringe with thick long hair, posterior border with shorter hair. Male abdomen with telson elongate. Female chelipeds smaller, with no hair on ventral surface of palms. Photo: preserved specimen.

Color: Unknown.

Size: Maximum recorded carapace width 33 mm.

Habitat: Mangrove and estuary.

Distribution: Bay of Bengal, and Sulawesi and Papua, Indonesia.

Parapyxidognathus deianira (De Man, 1888)

Diagnosis: Carapace convex, surface smooth and glabrous, broader than long. Front deflexed, postfrontal lobe separated from one another by rather deep narrow incision; regions indistinct. Anterolateral margin with 2 acute teeth behind exorbital angle; posterolateral margins dentate. Third maxillipeds with meri shorter than ischia; external distal angle of meri prolonged transversely outward; exognath about twice ischium width. Male chelipeds stout, equal or subequal; palms convex, smooth, longitudinal row of tubercles from tip of fixed finger to proximal part of palms; internal angle of carpi with 3 small teeth; meri with several tubercles on its margin. Ambulatory legs covered with setae, longer and denser on anterior and posterior margins; meri with 2 strong spines on anterior margin. Male abdomen rather narrow.

Color: Light to dark brown.

Size: Maximum recorded carapace width 80 mm.

Habitat: In mangrove environment, usually inside rotten wood trunk.

Distribution: Mergui Archipelago, Thailand, Philippines, and Ambon and Papua, Indonesia.

Varuna yui Hwang & Takeda, 1984

Diagnosis: Carapace flattened, slightly broader than long, surface smooth and glabrous. Front straight; regions indistinct. Anterolateral margins with 2 broad teeth behind exorbital angle. Third maxillipeds with meri shorter than ischia; external distal angle of meri auriculate outward; exognath smaller than ischium width. Male chelipeds strong, equal or subequal; palms convex, smooth; fixed finger deflexed; wide gape between dactyl and fixed finger; internal angle of carpi with 3 small teeth. Ambulatory legs laterally flattened, covered with short setae on outer and inner surfaces; anterior and posterior margins fringed with long and dense setae. Distal process of male first gonopod with 1 process distinctly longer.

Color: Carapace and walking legs brown, chelipeds light brown.

Size: Maximum recorded carapace breadth 37 mm.

Habitat: Occurring in estuarine waters up to 20 km inland in completely fresh water, very often found on log of drift wood in the stream.

Distribution: Indo West Pacific.

Utica borneensis De Man, 1895

Diagnosis: Carapace approximately as long as broad, dorsal surface covered with short setae, anterolateral margin with 2 rectangular teeth behind exorbital angle. Exorbital angle directed inward. Front deflexed, slightly downward, margin slightly sinuous. Postfrontal lobe separated one another by narrow suture. Regions distinct. Posterolateral margin of carapace slightly expanded. Chelipeds minutely tuberculate; median longitudinal ridge from tip of fixed finger to base of palm; inner surface of palms and articulation between dactyl and fixed finger and cutting edge with long and dense setae; meri with long and dense setae on inner surface and anterior and posterior margins. Ambulatory legs cylindrical, covered with short setae; anterior and posterior border with long and dense setae.

Color: Brown to light brown.

Size: Maximum recorded carapace breadth 15 mm.

Habitat: Muddy or muddy sand substrate in mangrove area.

Distribution: Singapore, Kalimantan and North Australia

Family Sesarmidae

Sesarmid crabs are characterized by quadrangular carapace with sub parallel, divergent or convergent, lateral margins. Dorsal surface of carapace is often with tuft of setae and regions usually discernible although the grooves are shallow. The body is sometimes deeply vaulted; pterygostomial, subbranchial and subhepatic regions are covered in reticulated network of short, hooked, close-set setae, each usually having a small granule at its base. Third maxilippeds are separated, leaving wide rhomboidal gap when closed, with an oblique setose ridge running across merus and ischium. Chelipeds are usually subequal and massive, the chelae sometimes with stridulatory structure.

Sesarmid crabs inhabit mostly mangrove environment; burrower, hide in crevices and climb trees. They are mostly herbivore but also scavenge on meat of fish or mollusk. Currently about 242 species and 29 genera of the family Sesarmidae are distributed in the world ocean. In the Mimika region, the family Sesarmidae is abundant in number of individuals with 12 genera and 20 species. However, considering the dense and vast mangrove forest of this region, it is very likely more species inhabit this area.

Key to the genera of the family Sesarmidae from Mimika region (modified from Serène & Soh, 1970)

1 • Antennal peduncle not excluded from orbit 2
• Antennal peduncle entirely excluded from orbit; bord anterolateral with lobes or teeth .....*Clistocoeloma*

2 • Meri of pereopods 4 and 5 with posterolateral border denticulate or serrate; small species .....*Nanosesarma*
• Meri of pereopods 4 and 5 without denticulation or serration..... 3

3 • One or 2 anterolateral tooth behind external orbital angle 4
• No anterolateral tooth behind external orbital angle; upper surface of palm of male chelipeds with 2-3 transverse pectinated crests ..... *Parasesarma*

4 • Upper surface of palm of male chelipeds with pectinated crest 5
• Upper surface of palm of male chelipeds without pectinated crest.....8

5 • Upper surface of palm with 2-3 tranverses pectinated crest.....*Perisesarma*
• Upper surface of palm with only 1 longitudinal pectinated crest clearly separated from upper inner margin of palm 6

6 • Frontal margin nearly straight, without well marked median concavity. Frontal breadth more than half exorbital breadth.....*Neosesarma*
• Frontal margin sinuous, with strongly marked median concavity 7

7 • Dactyls of pereopods 2-5 remarkably short, clearly less than half length of propodi; pectinated crest of palm strongly salient and proximally replaced by a nearly smooth salient rim; transverse granular tubercles not swollen .... *Selatium*

• Dactyls of pereopods 2-5 slightly shorter than or as long as propodi; pectinated crest of palm low, continues along dorsal margin; numerous transverse, broader than long, swollen dactylar tubercles closely fitted together as continuous rim ..... *Episesarma*

8 • Antennular basal segment slightly or not at all swollen and always at least twice as broad as long; pereopods 2-5 not remarkably long and narrow; body deeply vaulted 9

• Antenullar basal segment swollen and slightly broader than long; pereopods 2-5 remarkably long and narrow; body not deeply vaulted. 10

9 • Upper surface of palm of male chelipeds with 4-7 transverse grooves separating swollen wrinkles, some fringed by pectinated crest. Male abdomen without elongated telson ..... *Sarmatium*

• Upper surface of palm of male chelipeds without transverse grooves but somewhat flattened and limited outside by longitudinal smooth wrinkle sometimes only faintly indicated. Male abdomen with telson generally remarkably elongated..... *Neosarmatium*

10 • Front breadth at least subequal to breadth of posterior border of carapace; lateral border of carapace slightly convex, not diverging backward. Dactyls of 2-5 pereopods generally clearly shorter than propodi 11

• Front breadth clearly shorter than breadth of posterior border of carapace; lateral border of carapace straight or slightly concave, strongly divergent backward. Dactyls of 2-5 pereopods slim, nearly as long as propodus .... *Sesarmoides*

11 • Carapace broader than long, frontal margin distinctly bilobed. Propodi of second and third pereopods distally tapered, dactyls styliform, folding against tapered part of propodi when flexed ..... *Haberma*

• Carapace longer than broad, frontal margin distinctly quadrilobes. Propodi of second and third pereopods not tapered distally, dactyls not styliform .... *Labuanium*

Clistocoeloma amamaparense Rahayu & Takeda, 2000

Diagnosis: Carapace squarish, dorsal surface covered with numerous clumps of tomentum; front strongly sinuous medially; post frontal lobes with median pair very prominent, separated by moderately deep median furrow; lateral pair less prominent, separated from median lobes by shallow groove. Regions not strongly indicated. Anterolateral margin of carapace cut into 3 lobes, each with dense short setae. Chelipeds robust, dorsal surface of palms with longitudinal pectinated crest; dorsal surface of dactyls with 10 – 11 tubercles, widely spaced. Ambulatory legs moderately flattened, propodi, carpi and meri covered with short and dense setae, longer setae on anterior and posterior margins forming appearence like lobe; dactyls with less setae.

Color: Carapace and ambulatory legs dark brown, chelipeds cream to light brown; always covered with mud.

Size: Maximum recorded carapace width 18 mm.

Habitat: Mud substrate in mangrove area, often hide in rotten wood trunk or under wood log and in crevices.

Distribution: Presently it is found only in Mimika, Papua, Indonesia.

Nanosesarma edamensis (De Man, 1887)

Diagnosis: Carapace broader than long; epibranchial tooth rudimentary; dorsal surface with tuft of short setae. Frontal margin with weak median emargination. Male chelipeds equal; dactyls with 15 small dactylar tubercles, closely set proximaly, more separated distally; cutting edges of fingers with large teeth; palms smooth, outer surface with transverse pectinated crest and scattered tubercles near upper margin; near lower margin with longitudinal ridge starting from tip of fixed finger to base of propodus. Ambulatory legs moderately long, beset with tuft of setae; fifth pereiopods with 2 prominent spines and several smaller spines on posterior margin of meri, stronger spines on second to fourth pereiopods.

Color: Carapace mottled light and dark brown. Chelipeds cream, dactyls with shade of purplish brown, ambulatory legs dark brown. Animal usually covered with mud.

Size: Maximum recorded carapace width 8 mm.

Habitat: Sheltered mudflat in mangrove area.

Distribution: North coast of Java, Edam Island and Ambon (Indonesia).

Neosesarma rectipectinatum (Tweedie, 1950)

Diagnosis: Carapace broader than long, lateral margin with single small tooth behind large exorbital angle; dorsal surface beset with tuft of short setae, regions distinct. Front prominent, deflexed, frontal margin sinuous. Post frontal lobes of equal size, separated by shallow furrow. Chelipeds equal; dorsal surface of dactyls with 6-7 dactylar tubercles; dorsal margin of palms with 1 longitudinal pectinated ridge, dorsal surface finely granulated, ventral surface with stronger tubercles; mesial surface of meri flattened, expanded distally, margin serrated. Ambulatory legs slender, lateral surface beset with tuft of short setae, mesial surface of dactyls, propodi and carpi pubescens, anterior margin with long setae.

Color: Dark brown to light brown, cheliped light brown.

Size: Maximum recorded carapace width 22.8 mm.

Habitat: Muddy substrate in high mangrove forest.

Distribution: Labuan, Malaysia and south coast of Papua, Indonesia.

Parasesarma charis Rahayu & Ng, 2005

Diagnosis: Carapace wider than long; surface glabrous. Front deflexed downward, margin bilobed, each lobe broadly convex, separated by broad median concavity. External orbital tooth triangular, directed obliquely outwards, anterolateral margin without any tooth. Chelipeds subequal, robust; dorsal surface of dactyls with 26-28 symmetrical tubercles, small and closely set proximally, larger and widely spaced distally; several low tubercles on proximal third of inner edge of dorsal surface. Outer surface of palms striated proximally, smooth to gently granulate distally; upper surface with 3 distinct pectinated crest; outer margin and dorsal surface of carpi striated; meri with posterior margin carinate, minutely tuberculate, anterior margin with large subdistal spine. Ambulatory legs slender, flattened, dactyls almost as long as propodi. Photo: preserved specimen.

Color: Carapace dark brown to almost black, mottled with light brown. Palms and dactyls of chelipeds bright red.

Size: Maximum recorded carapace width 11mm

Habitat: Mud substrate in mangrove environment.

Distribution: Mimika, Papua.

Parasesarma leptosoma (Hilgendorf, 1869)

Diagnosis: Carapace about 1.1-1.25 broader than long; dorsal surface with scattered short setae, regions distinct; front deflexed downward, margin sinuous, bilobed. Post frontal lobes separated one another by shallow furrow; surface with scattered tubercles. External orbital tooth triangular, anterolateral margin entire, without trace of tooth. Chelipeds equal; dactyls with 7-8 tubercles on dorsal surface; palm with scattered tubercles, outer surface with 2 pectinated crests. Ambulatory legs remarkably long and slim, dactyls remarkably short; propodi about 2.5 length of dactyls. Photo: preserved specimen.

Color: Carapace mottled light brown and dark brown; palm of chelipeds whitish yellow, fingers reddish orange.

Size: Maximum recorded carapace width 15 mm.

Habitat: Muddy substrate in mangrove forest.

Distribution: East Africa, Singapore, Malaysia, Philippines, Halmahera and Ambon, Indonesia; New Guinea.

Parasesarma rutilimanum (Tweedie, 1936)

Diagnosis: Carapace slightly wider than long; dorsal surface smooth and shining, regions indistinct. Frontal margin slightly sinuous; post frontal lobe less prominent, separated one another by shallow furrow. Branchial ridge distinct. External orbital tooth triangular, no teeth on anterolateral margin. Chelipeds robust; dorsal surface of dactyls with 25-29 tubercles, closely set proximally, widely spaced distally; next to these tubercles 2 irregular rows of tubercles started from articulation of dactyl to midlength, widely separated proximally and coalescing distally; palms smooth, outer surface with 1 distinct pectinated crest followed by 2 rows of small tubercles; carpi covered with tubercles arranged in transverse rows; meri with prominent spine on anterior margin. Ambulatory legs slender, dactyls almost as long as propodi.

Color: Carapace and pereopods dark brown with light brown spots; chelipeds yellowish orange, dactyls and fixed fingers red.

Size: Maximum recorded carapace width 10 mm.

Habitat: Muddy substrate in mangrove forest.

Distribution: Singapore and south coast of Papua.

Perisesarma cricotus Rahayu & Davie, 2002

Diagnosis: Carapace smooth, regions distinct; front with rounded lobes on either side of broad, shallow median emargination; lateral margin of carapace with single epibranchial tooth behind sharp exorbital angle. Chelipeds strong, equal, dorsal surface of dactyls with 11 distinct, subcircular tubercles; each tubercle with fine circular lines; row of sharp, distinct granules on proximal two-thirds of inner edge of dorsal surface; palms with 2 transverse pectinated crests, primary crest composed of 14-22 tall teeth; secondary crest with 9-17 smaller teeth; row of blunt tubercles proximal to secondary crest. Female chelipeds smaller, dactylar tubercles and pectinated crest indistinct.

Color: Carapace greenish or bluish brown with dark brown pattern. Cheliped bright red or orange.

Size: Maximum recorded carapace width 22 mm.

Habitat: Muddy substrate in mangrove area.

Distribution: South coast of Papua, Indonesia.

Perisesarma foresti Rahayu & Davie, 2002

Diagnosis: Carapace punctate, smooth and with scattered tufts of setae. Front with rounded lobes on either side of broad, shallow median emargination. Lateral margin of carapace with single epibranchial tooth behind sharp exorbital angle. Chelipeds robust, dorsal surface of dactyls with 11-12 oval to subcircular tubercles; each tubercles with fine longitudinal lines and shallow indistinct median groove; row of sharp, distinct granules on proximal two-thirds of inner edge of dorsal surface. Palms with 2 transverse pectinated crests, primary crest composed of 11-17 broad teeth; secondary crest smaller but still well developed. Female chelipeds smaller, dactylar tubercles and pectinated crest indistinct.

Color: Carapace black, dark blue or dark brown with green yellowish pattern. Front and epistome yellowish green. Merus and carpus of cheliped dark red to brown, palm and dactyl bright red.

Size: Maximum recorded carapace width 23 mm.

Habitat: Sheltered muddy substrate in mangrove environment; hiding under wood trunk or in crevices.

Distribution: South coast of Papua, Indonesia.

Perisesarma semperi (Bürger, 1895)

Diagnosis: Carapace approximately 1.5 wider than long, dorsal surface with scattered small tufts of setae, regions apparent. Front slightly sinuous, oblique on either side of broad median emargination; anterolateral margin of carapace with single tooth behind sharp exorbital angle. Chelipeds robust, equal, dorsal surface of dactyls with 7-8 tubercles, dome shaped, symmetrical in profile, widely spaced; palms with 2 transverse pectinated crests, distal one composed of 20-22 teeth. Ambulatory legs of normal length, dorsal margin of propodi, carpi and meri with short setae; dactyls almost as long as propodi. Female with smaller chelipeds, dactylar tubercles and pectinated crest on palm less distinct.

Color: Carapace brown with olive green spots; propodi of chelipeds red, dactyls and fixed fingers yellowish orange; ambulatory legs greenish brown with brown band.

Size: Maximum recorded carapace width 17 mm.

Habitat: Sheltered sandy mud substrate in mangrove area.

Distribution: Philippines and Labuan, Malaysia

Perisesarma sp.

Diagnosis: Carapace smooth and shining with hairs along branchial lines and forming distinct rows of close-packed hairs on rest of carapace. Front with rounded lobes on either side of broad, shallow median emargination. Lateral margin of carapace with single epibranchial tooth behind sharp exorbital angle. Chelipeds strong, dorsal surface of dactyls with 13-16 low, subcircular tubercles, proximal 5-8 tubercles distinct, more distal become progressively almost indiscernible; row of sharp, distinct granules on proximal two-thirds of inner edge of dorsal surface, often more obvious than tubercles. Palms with 2 transverse pectinated crests, primary crest composed of 14-19 broad teeth; secondary crest smaller but still well developed. Second segment of male abdomen slightly expanded medially.

Color: Carapace dark brown with yellowish white spot, front yellowish white. Chelipeds bright red, lower margin of palm yellowish red.

Size: Maximum recorded carapace width 25 mm.

Habitat: Muddy substrate in mangrove areas; retreats very quickly to its burrow when disturbed.

Distribution: South coast of Papua.

Selatium brockii (De Man, 1887)

Diagnosis: Carapace shallow, nearly flat dorsaly, as long as broad, surface with scattered tufts of setae. Regions apparent. Front sinuous, bilobed; post frontal cut into 4 lobes, separated by deep furrow, surface with minute tubercles. Anterolateral margins with 2 small teeth behind large exorbital angle. Chelipeds equal, moderately stout; dactyls with 25 tubercles on upper border, large and distinct proximally, becoming less distinct distally; outer surface of palms minutely granular, upper border with longitudinal pectinated crest; carpi minutely granular; anterior margin of meri protruding distally and armed with several small tubercles. Pereopods 2-5 long and flattened; dactyls remarkably short, half length of propodi with short tomentum; meri with 2 distal spines on posterior margin.

Color: Capace mottled dark brown, light brown and yellow, cheliped light brown with dark brown irregular spot; ambulatory legs mottled dark brown and light brown.

Size: Maximum recorded carapace width 24 mm.

Habitat: Burrows in muddy substrate of mangrove area.

Distribution: Andaman, Singapore; Ambon, Papua Indonesia.

Episesarma lafondi (Hombron & Jacquinot, 1846)

Diagnosis: Carapace transversely rectangular, dorsal surface covered with short tuft of soft setae; lateral margins armed with 2 teeth. Front half length of orbital width, moderately deflexed, bilobed. Region strongly indicated. Chelipeds equal, prominent tubercles on dorsal margin of dactyl numbering 84 – 94, dorsal margin of palm with longitudinal pectinated ridge, consisting of numerous black and obtuse teeth; mesial to pectinated crest, 4-5 rows of tubercles arranged almost longitudinally; ventral surface of palm with transverse prominent ridge. Ambulatory legs with scattered setae on anterior margin; dactyls short, about 0.7 length of propodi.

Color: In general brownish red, chelipeds dark red, most of the outer surface of the palm and the dactyl dark red or violet; lower part of palm light brown; cutting edges white, ambulatory legs brownish red.

Size: Maximum recorded carapace width 37 mm.

Habitat: Mud substrate in mangrove area; lives in crevices, sometimes climbing trees.

Distribution: Malay Peninsula, Japan and Indonesia.

Sarmatium crassum Dana, 1851

Diagnosis: Carapace deeply vaulted, convex in both direction; slightly broader than long. Dorsal surface smooth, regions moderately defined, setae arranged sparsely on branchial line. Front moderately deflexed, with shallow median emargination, bilobed. Lateral margin with 2 blunt teeth behind blunt exorbital angle. Chelipeds robust, subequal; dorsal surface of dactyls with 4 large chitinous tubercles in proximal three-fifth, followed by 12-14 small, closely set, chitinous tubercles; outer surface of palm smooth and punctate; upper surface of palms with 5-6 relatively evenly spaced transverse groove separating 6 swollen ridges; carpi with finely granular area distally. Photo: preserved specimen

Color: Carapace dark brown to light brown.

Size: Maximum recorded carapace width about 10 mm.

Habitat: Burrow in muddy substrate in mangrove area; this species carries leaves to its burrow for feeding.

Distribution: Red Sea, Madagascar, South Africa, Sulu Archipelago, Queensland, and Papua.

Sarmatium germaini (A. Milne Edwards, 1869)

Diagnosis: Carapace sub-quadrat, strongly convex. Dorsal surface smooth, regions moderately defined. Front deflexed, margin sinuous, bilobed. Lateral margin with 2 feeble teeth behind sharp exorbital angle. Chelipeds strong; dorsal surface of dactyls with 3 large chitinous tubercles on proximal half, followed by 17-18 small acute chitinous tubercles; upper surface of palms with 7-8 relatively evenly spaced transverse groove separating 8 swollen ridges; ventral border of propodi with longitudinal ridge extending onto fixed finger; carpi with finely granular area distally. Ambulatory legs medium length, cylindrical, slender. Male abdomen relatively narrow; third segment widest; telson length subequal to sixth segment, evenly rounded.

Color: Carapace brown tinge with purple; carpi of chelipeds purplish brown, palms and dactyls yellowish white.

Size: Maximum recorded carapace width about 25 mm.

Habitat: Burrow in muddy substrate in mangrove area.

Distribution: South China Sea, Hongkong, Malaysia, Singapore, Philippines, and northern Australia.

Neosarmatium bidentatum Rahayu & Davie, 2006

Diagnosis: Carapace transversely subrectangular, distinctly vaulted, entire surface minutely punctate, glabrous. Postfrontal lobes swollen, separated by deep narrow grooves. Anterolateral margin with 2 blunt teeth behind acutely triangular exorbital angle. Chelipeds equal, robust; dorsal surface of dactyls with 2 inwardly directed chitinous spines tipped teeth on inner side of proximal quarter; outer surface of palms naked, coarsely punctate with low and barely discernible medial longitudinal ridge, row of short setae in gape below articulation with dactyl. Walking legs moderately long, second and third pair longer; dactyls slightly shorter than propodi. Male abdomen moderately wide, telson evenly rounded, sixth segment longest. Photo: preserved specimen.

Color: Carapace and ambulatory legs mottled dark and light brown, chelipeds light cream.

Size: Maximum recorded carapace width 18 mm.

Habitat: Muddy substrate in mangrove forest

Distribution: At this time known only from Mimika region, Papua.

Neosarmatium papuense Rahayu & Davie, 2006

Diagnosis: Carapace broader than long, distinctly vaulted, surface smooth, minutely punctate. Anterolateral margin with 1 forwardly directed tooth behind exorbital angle, second anterolateral tooth minute, barely discernible. Chelipeds robust, subequal; dorsal surface of dactyls with low elevation over proximal 1/3, armed with 2 chitinous teeth and 1 smaller non-chitinous proximal tooth; outer surface of palms naked, median longitudinal ridge low and barely discernible, row of short setae in gape below articulation with dactyl. Walking legs moderately long, second pair longest; dactyls slightly shorter than propodi. Male abdomen moderately wide with sixth segment longest. Photo: preserved specimen.

Color: Carapace and ambulatory legs dark brown, chelipeds cream.

Size: Maximum recorded carapace width 19.5 mm

Habitat: Muddy substrate in mangrove forest

Distribution: At this time known only from Mimika region, Papua.

Neosarmatium trispinosum Davie, 1994

Diagnosis: Carapace slightly broader than long; anterolateral margin with 2 forwardly directed teeth behind exorbital angle. Carapace surface smooth, shining, punctate. Setae in short tufts on anterior half and posteriorly in rows along branchial margin. Chelipeds robust; dorsal surface of dactyls with 3 large acute chitinous spines set close together in proximal two third, conical, smallest near articulation, largest distally; upper surface of palms defined anteriorly by swollen ridge; outer surface of palms naked, punctuate. Walking legs moderately long, second pair longest; dactyls slightly shorter than propodi. Male abdomen with six th segment longest.

Color: Carapace and chelipeds reddish brown; becoming bright red after preservation in alcohol.

Size: Maximum recorded carapace width 25 mm.

Habitat: Muddy substrate in mangrove forest. This species is a major leaf consumer; carries leaves into its burrow.

Distribution: New Caledonia, Fiji, New Guinea, northern Australia.

Sesarmoides borneensis (Tweedie, 1950)

Diagnosis: Carapace slightly flattened, dorsal surface with scattered setae, gastric region distinct; posterolateral margin expanded; anterolateral margin with 2 teeth behind exorbital angle; exorbital angle acute, first teeth wide, separated from exorbital angle by V-shaped notch, second teeth minute. Front bilobed, oblique; post frontal lobes separated by deep and wide incision. Chelipeds robust, outer margin of fixed finger with row of 4 corneous teeth, decreasing in size distally; dactyl and palm smooth. Ambulatory legs long and slender, fourth legs longest; lateral surface of dactyls and part of propodi covered with short setae; meri with strong subdistal spine.

Color: In general dark red with whitish yellow chelipeds.

Size: Maximum recorded carapace width 13 mm.

Habitat: Muddy substrate in mangrove area, hide under wood trunk

Distribution: Kalimantan, Labuan, Malaysia and Singapore.

Haberma kamora Rahayu & Ng, 2005

Diagnosis: Carapace 1.1 broader than long; regions well defined. External orbital tooth triangular; antero-and posterolateral margins not demarcated, without trace of tooth or indentation. Chelipeds subequal, robust. Outer and inner surface of palm smooth to gently rugose. Upper surface of palm with several short uneven ridges lined with very small rounded granules, not pectinated. Dactyls of first and second legs styliform, narrow, with brush-like setae proximally along ventral margin; dactyl folding against tapered part of propodus when flexed, brush-like setae of each appendages appressing tightly against each other, forming distinct subchelate structure. Propodi dan dactyls of third and fourth legs normal, not subchelate. Female with propodi and dactyls of first and second legs not clearly subchelate, without brush-like setae on ventral margin.

Color: Uniformly brown with ventral surface lighter in color, chelae orange.

Size: Maximum recorded carapace width 7 mm.

Habitat: Muddy substrate in mangrove.

Distribution: Papua, Indonesia.

Labuanium politum (De Man, 1888)

Diagnosis: Carapace squarish, longer than wide, dorsal surface flattened, smooth and shining; regions distinct; 2 anterolateral teeth behind exorbital angle. Front widely emarginate medially, presenting on each side slightly prominent and small lobe. Some tubercles on upper post frontal lobe arranged in transverse row. Post frontal lobes separated from one another by rather deep grooves, anterior margin denticulated. Chelipeds robust, lateral face of dactyls smooth, palms, carpi and meri covered with tubercles. Ambulatory legs long, rather flattened, dactyls short, less than half length of propodi, with short and thick tomentum; meri slender, 3 times as long as broad.

Color: In general dark red, ambulatory legs greenish brown.

Size: Maximum recorded carapace width 25 mm.

Habitat: Muddy substrate in mangrove area, sometimes found climbing root of mangroves trees.

Distribution: Indian Ocean, Mergui Archipelago, Malaysia, Singapore and Indonesia.

Family Grapsidae

Most members of this family have circular carapace, lack of hairy oblique ridge on merus and ischium of third maxillipeds, pterygostomial region is setose but not network-like (reticulated), and very short antennal flagellum. Chelipeds are equal or subequal and massive, the ambulatory legs long and flattened but not paddle-like. Species of this family move very quickly on sandy mud substrate, some species climb mangrove trees. They are primarily scavengers of animal and plant debris. This family currently contains 6 genera and 41 species, distributed worldwide, mostly tropical and subtropical. It is essentially littoral, some species inhabit estuaries, river mouth or entirely freshwater.

In Mimika region two species, *Metopograpsus frontalis* and *Metopograpsus latifrons* are collected in sheltered mangrove area.

Metopograpsus frontalis from Ajkwa Island

Metopograpsus frontalis Miers, 1880

Diagnosis: Carapace broader than long, no teeth behind exorbital angle; dorsal surface smooth and shining, regions not well defined. Front wide, margin slightly sinuous medially. Post frontal lobes with outer lobes larger than median lobes, short transverse ridges on dorsal surface. Chelipeds moderately stout, subequal; outer surface of palms smooth, fine and barely discernible longitudinal ridge near lower margin continue to fixed finger, upper border with few tubercles; upper border of dactyls with few tubercles; inner anterior border of meri with large spines distally, outer surface with striae. Ambulatory legs slender, dactyls short.

Color: Carapace dark greenish blue with yellow marking, cheliped cream whitish, with bluish shade.

Size: Maximum recorded carapace width 30 mm.

Habitat: Sandy mud or sand flat, sometimes climbing trees.

Distribution: Indo West Pacific.

Metopograpsus latifrons (White, 1874)

Diagnosis: Carapace broader than long, lateral margin unarmed (no teeth behind exorbital angle); dorsal surface smooth and shining, regions distinct. Front very prominent, deflexed, frontal margin straight and strongly tuberculate. Post frontal lobe not of equal size, outer lobes larger than median, separated by shallow furrow; free edge sharply defined and granulated. Chelipeds moderately stout, external surface of palm with prominent ridge extended almost to finger tip; anterior part with several transverse ridges, posterior part with several tubercles. Ambulatory legs slender, dactyls short, less than half length of propodi; anterior margin of propodi with dense pubescent area. Chitinous projection of male pleopod obliquely T-shaped, distal margin curved and serrated.

Color: Carapace dark purple with brown marking, cheliped bluish purple.

Size: Carapace width 40 mm.

Habitat: Common in mangrove forest near water stream; very often found climbing mangroves trees.

Distribution: Indo-West Pacific from South India to New Caledonia.

Superfamily Leucosioidea - Pebble crabs

The superfamily Leucosioidea contain 2 families, Iphiculidae and Leucosidae. The two families are distinguished by the form of female abdomen. In the family Iphiculidae female has all seven segments of the abdomen completely free and in normal form which is not dome-shaped and relatively much narrower and flatter. Female of the family Leucosidae has some of the abdomen somites fused and strongly arched forming a dome shape over the sternum, hiding completely the eggs in ovigerous female. Both families were found in the Mimika region, Iphiculidae represented by one species while Leucosidae represented by six species.

Family Iphiculidae

Carapace circular, subcircular or transversely ovate, the front is narrow, orbit obliquely elongate and completely concealing the eyes. Chelipeds are long, palm is short, fingers are slender much longer than palms and somewhat hooked. Male abdomen with somites 3 and 4 fused, all somites of female abdomen are free. The family contains two genera and five species. Only one species, *Iphiculus spongiosus* was found in Mimika region.

Iphiculus spongiosus Adams & White, 1848

Diagnosis: Carapace covered with short tomentum, longer setae on lateral margin. Anterolateral margin with 4 strong teeth, fourth tooth strongest, directed laterally. Front small, bilobed. Chelipeds covered with short tomentum except fingers; fingers crossing at tip; cutting edges with strong spines; palms swollen, carpi short; meri tuberculates. Walking legs covered with tomentum; dactyls long and with longer setae. Male abdomen consists of six segments (third and fourth segments fused); telson long, with long setae. Female abdomen consists of seven distinct segments.

Color: Uniform light brown.

Size: Maximum recorded carapace width about 17 mm.

Habitat: Sandy mud or soft mud substrate at depth 11-200 m.

Distribution: Red Sea, India, Gulf of Bengal, Thailand, China, Philippine, Singapore and Indonesia.

Family Leucosiidae

The body is usually rounded or diamond shaped often with distinctive pronounced front. Carapace is subcircular, ovoid, pyriform or pentagonal, hard and solid with small and inconspicuous eyes. Antennules fold obliquely; antennales are small, sometimes obsolete. Chelipeds are long with meri, palms and fingers very often elongated. Walking legs are slender; in some species it is concealed under carapace. Abdomen with some somites fused in both sexes.

This is a slow moving crab; the long chelipeds and slender walking legs are not fitted for any rapid or energetic movement. To avoid danger or predator they play dead by staying still with all walking legs concealed under the body.

This family is essentially marine, living in littoral to deeper seas. Currently about 62 genera and about 475 species are recognized from all over the world. The pebble crabs are rare in mangrove, in Mimika region two species are found in mangrove forest and 4 species are captured from estuarine and river mouth area.

Ixa edwardsii Lucas, 1858

Diagnosis: Carapace much broader than long with lateral projection gradually tapering to pointed tip, covered with round granules; regions demarcated by shallow grooves, intestinal region elevated to form small mound, posterior margin with two round lobes; front broadly bidentate. Endognath of ischium of third maxillipeds covered with closely packed large, pearly granules, except for inner edge; proximal 0.75 of exognath covered in similar fashion. Chelipeds long and slender, fingers about half length of palms. Pereopods long and slender; dactyls with fringe of setae on dorsal and ventral margin. First male pleopod long with pointed tip, second pleopod shorter. Female abdomen coarsely granular, with two grooves running on either side of median line. Photo: preserved specimen.

Color: Unknown

Size: Maximum recorded carapace width 35 mm.

Habitat: Sandy mud, soft mud and sand substrate at 16-76 m.

Distribution: Red Sea, Persian Gulf, Turkay, Zanzibar, India, China, Philippines, Indonesia and Northern Australia

Leucosia alcocki Ovaere, 1987

Diagnosis: Carapace approximately as long as broad, urn shape; front broad, weakly bilobed. Anterolateral margin of carapace with large tubercles, posterior margin rounded; posterolateral margin with tuft of setae; intestinal region raised to form small mound. Chelipeds robust; dactyls with median longitudinal ridge; row of granules from fixed finger to base of palm; ridge along cutting edge of fixed finger to distal margin of palm; lower margin of palm with row of small granules; carpi tuberculates; meri not inflated, rows of granules on posterior and anterior margins, and on surface, setae on proximal region. Photo: preserved specimen.

Color: Greyish white.

Size: Maximum recorded carapace width 6 mm.

Habitat: Sandy-mud substrate in estuarine area.

Distribution: India, Persian Gulf, Andaman Sea, Japan and Papua New Guinea

Leucosia pubescens Miers, 1877

Diagnosis: Carapace hexagonal, surface smooth, lateral margin slightly granulated. Front with 3 triangular teeth; median tooth larger. Dactyls and propodi of chelipeds compressed, fixed fingers deflexed, lower margin of palms and fixed fingers with row of tubercles, larger proximally; meri with large tubercles on upper and lower margin, proximal surface with short tomentum. Walking legs moderately long, dactyls flattened. Male abdomen narrow, third to sixth segment fused; first male gonopod slender, apex truncate, setose. Photo: preserved specimen.

Color: In alcohol grayish brown.

Size: Maximum recorded carapace width 18 mm.

Habitat: Sandy-mud substrate in estuarine area.

Distribution: Indian Ocean from the Red sea, East Indies, Eastern and western Australia and Kupang, Papua Indonesia.

Phylira bicornis Rahayu & Ng, 2003

Diagnosis: Carapace broadly hexagonal, almost as broad as long, dorsal surface convex. Regions indistinct. Front with slight median emargination. Elevation on cardiac and intestinal regions with large granules, middle line of carapace with longitudinal row of granules, short row of granules extending from cardiac region on either side of gastric region. Branchial region with large granules joining oblique row of granules on third distal of posterior margin. Margin of hepatic region excavated to form deep sinus. Chelipeds long, outer surface of dactyls with 2 longitudinal ridges, outer surface of fixed finger with longitudinal groove; outer surface of palm smooth or with scattered flattened tubercles, upper and lower margins with dense tubercles. Male abdomen narrow, consists of 3 segment (second to sixth segments fused); female abdomen convex, third to sixth segments fused.

Color: Dark brown.

Size: Maximum recorded carapace width 9 mm.

Habitat: Mud substrate in mangrove forest near river mouth.

Distribution: Mimika region, Papua, Indonesia.

Philyra heterograna Ortmann, 1892

Diagnosis: Carapace urn shape, tuberculate, slightly broader than long; lateral margin tuberculate. Front broad, truncate and short. Chelipeds long; dactyls curved, narrow longitudinal sulcus on outer surface of fingers; palms granulous, denser on lower margin, fixed fingers deflexed; carpi with granules on inner margin; meri sinuous, covered with granules. Male abdomen narrow, third and fourth segments fused; sternum granulous; male first gonopod slender, distal region broader, apex setose ending in small conical projection. Female abdomen granulous. Walking legs short and slender.

Color: Unknown.

Size: Maximum recorded carapace width 17.5 mm.

Habitat: Sandy mud substrate in estuarine area.

Distribution: Indonesia.

Phylira nishihirai Takeda & Nakasone, 1991

Diagnosis: Carapace broadly hexagonal, broader than long, anterolateral, posterolateral and posterior margins rimmed with granules. Dorsal surface strongly convex, regions indistinct. Ridge on each side of cardiac and mid branchial regions with strong tubercles. Intestinal region raised to form mound, with large tubercles continue onto mid cardiac region. Front nearly straight with slight median emargination. Margin of hepatic region excavated to form deep sinus. Chelipeds equal, smooth except several weak tubercles on lateral surface of meri. Walking legs subcylindrical. Male abdomen narrow, second to sixth segments fused, suture indistinct; female abdomen convex, third to sixth segments fused.

Color: Dark brown.

Size: Maximum recorded carapace width 7.5 mm.

Habitat: Mud substrate in the mangrove near river mouth.

Distribution: Japan and South coast of Papua, Indonesia

Superfamily Majoidea

In the Mimika region only family Hymenosomatidae, which is included provisionally in the superfamily Majoidea (Ng *et al*., 2007), was found.

Family Hymenosomatidae - Crown Crabs

Diagnosis characters include thin and flat carapace that is triangular or subcircular and poorly calcified, usually produced to form a horizontal rostrum. No orbit, eyes are exposed and a little contractile. Buccal cavern is square, epistome sometimes nearly as long as broad, ischium of third maxillipeds are well developed. Chelipeds are not long or especially mobile or with fingers bent at an angle to the hand. Ambulatory legs are slender, long or short. Male abdomen six segmented.

The hymenosomatids crabs are more commonly known as crown crab or false spider crabs because of their general similarity to the true spider crabs (long ambulatory legs with carapace longer than wide). They were found almost exclusively in the Indo-Pacific with currently 91 species in 16 genera known. The majority of the species are marine, although some species live in fresh water or in lagoon or estuarine areas with low or variable salinity. They prefer soft, muddy substrate and rely for camouflage on their cryptic coloration, the carapace and legs always are covered by mud. During low tide they remain buried in the mud. They are among the smallest brachyuran crabs with the biggest carapace width of 26 mm.

Amarinus pristes Rahayu & Ng, 2004

Diagnosis: Carapace flattened, subcircular, almost as long as broad. Dorsal surface smooth with distinct cervical, thoracic and gastrocardiac grooves. Anterolateral margin gently crenulated with soft curved setae. Rostrum unilobed, broad, pointed, surface gently concave, continue with dorsal surface of carapace. Eyestalk prominent. Third maxillipeds cover mouth field when closed, ischia shorter than meri along outer lateral edge. Chelipeds equal, stouter than ambulatory legs, slightly pubescens, fingers with cutting edge slightly serrated, dactyls with one strong spine. Ambulatory legs stout, dorsal and ventral margin with curved setae, dactyls with subdistal spine and long setae ventrally. Male abdomen six segmented, free.

Color: Dark brown, covered with mud.

Size: Small species, carapace width 5 mm.

Habitat: Muddy substrate in high maangrove area.

Distribution: South coast of Papua, Indonesia.

Elamenopsis lineata A. Milne Edwards, 1873

Diagnosis: Carapace oval, dorsal surface flattened, smooth, cervical, thoracic and gastrocardiac grooves distinct. Cervical and thoracic grooves branched. Rostrum unilobed, triangular, sharply deflexed. Eyes distinctyly visible dorsally. Third maxillipeds not covering three quarter of mouth field, ischia shorter than meri. Chelipeds equal, stouter than ambulatory legs. Palms surfaces smooth with scattered short setae, dactyls with broad, truncate tooth on subproximal part, fixed fingers with small triangular tooth. Ambulatory legs broad, dactyls, propodi and carpi of second and third legs covered with dense short setae, short setae interspersed by long setae on dorsal and ventral margin. Posterior margin of meri with dense short and long setae. Fourth and fifth legs less setose. Female abdomen squarish, 3-5 segments fused.

Color: Brown, covered with mud.

Size: Maximum recorded carapace width 5 mm.

Habitat: Mud substrate in mangrove area.

Distribution: New Caledonia, Queensland, Sulawesi and now southwest coast of Papua.

Neorhyncoplax aspinifera (Lucas, 1980)

Diagnosis: Carapace flat, subcircular, longer than broad, surrounded by distinct, complete rim, dorsal surface smooth with distinct cervical, thoracic and gastrocardiac grooves. Rostrum distinctly trilobed, median largest. Eyestalk well developed. Third maxillipeds narrow, not covering mouth field when closed. Chelipeds equal, stouter than ambulatory legs, palm swollen, cutting edges with large teeth, dorsal and ventral margin barely setose. In female, chelipeds slender, no teeth on cutting edges. Ambulatory legs long, curved setae on dorsal and ventral margin, dactyls slightly recurved. Male abdomen narrow, 3-4 segments fused, 3-5 of female abdomen fused with no distinct suture

Color: Transparent, covered with mud.

Size: Maximum recorded carapace width about 3 mm.

Habitat: Muddy substrate in mangrove area near river mouth.

Distribution: Queensland, Australia and south coast of Papua, Indonesia

Neorhyncoplax elongata Rahayu & Ng, 2004

Diagnosis: Carapace flat, subcircular, longer than broad, surrounded by distinct, complete rim, dorsal surface with distinct cervical, thoracic and gastrocardiac grooves. Rostrum distinctly trilobed, median largest. Eyestalk prominent, distinctly visible dorsally. Third maxillipeds covering two third of mouth field when closed. Chelipeds equal, stouter than ambulatory legs, outer surface pubescent; fingers slender, same length as palm, cutting edges serrated. Ambulatory legs slender; dactyls much shorter than propodi, with sharply hooked tips ventral margin with row of six teeth and densely lined with long and short setae. Propodi, carpi and meri with sparse setae. Female abdomen oval, convex, covers entire sternum, 3-5 segments fused.

Color: Transparent brownish white, covered with mud.

Size: Maximum recorded carapace width 4 mm.

Habitat: Muddy substrate in mangrove area near river mouth.

Distribution: Mimika, Papua, Indonesia

Superfamily Pilumnoidea
Family Pilumnidae - Hairy crabs

Although called hairy crabs, the species of the family Pilumnidae very often are not hairy at all. The appearance is highly variable and not easy to identify. The most important character is the second gonopod of male which is very short and sigmoid while the first gonopod is slender, S-shaped, distal part simple. Male abdominal segments 3 to 5 are freely movable.

Sixty one genera of the family Pilumnidae occur in a wide range of habitats including mud, sand, rock, coral reef and mangrove, in intertidal or shallow subtidal area to deep sea. In Mimika region one species of the genus *Benthopanope* and two species of the genus *Heteropanope* are found in mangrove area.

Key to the genera of Pilumnidae from Mimika region:

- Front broadly bilobed, suborbital margin without strong tooth which can be seen from above ..... *Heteropanope*

- Front protruding with prominent median lobes and distinct lateral lobes; suborbital margin with strong triangular tooth which can be seen from above ... .*Benthopanope*

Benthopanope estuarius Davie, 1989

Diagnosis: Carapace convex, approximately 1.3 broader than long; dorsal surface finely granular. Regions strongly defined by granular dorsal crest. Frontal margin protruding, lobes rounded. Anterolateral margin cut into 5 teeth, second teeth smallest; fifth teeth projecting laterally beyond preceding tooth. Chelipeds unequal, robust. Dactyl of major cheliped stout, palm smooth, upper margin granular; fixed finger slightly deflexed. Smaller cheliped of similar form but less robust; fixed finger strongly deflexed. Walking legs covered with short tomentum especially on dactyl and propodus. First male gonopod long and thin with the tip curled back on itself.

Color: In general mottled light brown and cream; lower margin of palm and fingers of chelipeds cream.

Size: Maximum recorded carapace width 21 mm.

Habitat: Under wood trunk on muddy sand in mangrove area.

Distribution: Northern Australia and Mimika, Papua

Heteropanope glabra Stimpson, 1858

Diagnosis: Carapace wider than long, convex; surface smooth or finely granular; regions poorly defined. Frontal margin cut into 2 wide lobe, granulate on its margin and with few short setae. Anterolateral margin finely granular, cut into 4 teeth; first and second teeth broad; third slightly smaller, fourth smallest. Chelipeds unequal, massive; major cheliped smooth and glabrous; dactyl strongly curved; palm swollen, fingers pointed, fixed finger deflexed, gape between fingers; carpus with strong, blunt tooth on inner margin. Small cheliped less massive, similar form but no gape between fingers. Walking legs unarmed and with relatively long scattered setae. Male first gonopod sinuous with downturned pointed tip.

Color: Carapace surface dark brown anteriorly, mottled dark brown and white or cream posteriorly. Dactyl and fixed finger of chelipeds light brown, rest of chelipeds and pereopods dark brown speckled with white.

Size: Maximum recorded carapace width 20 mm

Habitat: Inside rotting wood trunk.

Distribution: Mergui archipelago, Hongkong, Singapore, New Caledonia and northern Australia.

Heteropanope longipedes Davie, 1989

Diagnosis: Carapace strongly convex, ovate; surface appearing smooth but evenly microscopically granular, without setation; region poorly defined. Front moderately produced with broad shallow emargination; no preorbital lobes. Anterolateral margin cut into 4 teeth including exorbital angle, first to third teeth similar in size, fourth teeth small and sub acute. Chelipeds unequal, major cheliped massive, appearing smooth but evenly microscopically granular. Smaller cheliped similar with palm more slender. Ambulatory legs long and slender, merus almost 3 times length of carpus. First male gonopod sinuous, with recurved narrowed tip.

Color: In general brown with dark brown spots; chelipeds light brown with dark brown spots; dactyl of cheliped blue proximally, dark brown distally; fixed finger brown at tip.

Size: Maximum recorded carapace width16 mm

Habitat: Muddy substrate in mangrove area near estuary, sometimes inside rotten wood.

Distribution: Philippines, Palau Island, and Northern Australia.

Superfamily Portunoidea
Family Portunidae - Swimming Crabs

Family Portunidae is easily recognized by the flattened form of the last pair of walking legs with propodus and dactyl paddle-like, used for swimming, burrowing and working their way under the sand for protection.The diagnostic characters of this family comprise flattened or slightly convex carapace, which is usually broader than long, with one to nine teeth along its side. The maximum width of the carapace is almost always between the last anterolateral teeth. The front is broad, horizontal and lobulate or dentate. Chelipeds are typically robust with fingers usually sharply pointed, occasionally spoon-shaped. Walking legs are laterally flattened, the last 2 segments of last walking leg are paddle-like. Male abdominal segments 3-5 are fused, immovable.

This marine crabs are well represented in Indo-West Pacific with currently around 210 species in 18 genera recognized; most of the species are edible including the famous delicious mud crab, *Scylla* spp. Fourteen species belonging to 5 genera of the family Portunidae were found in Mimika region.

Key to the genera of Portunidae from Mimika region:

1 • Ocular peduncles very long, longer than orbit ..... *Podophthalmus*
• Ocular peduncles not longer than orbit 2
2 • Anterolateral margin with 9 teeth 3
• Anterolateral margin with less than 9 teeth 4
3 • Carapace relatively broad; last anterolateral tooth long .....*Portunus*
• Carapace broad, last anterolateral tooth not obviously larger than others .... *Scylla*
4 • Anterolateral margin with 6 teeth ..... *Charybdis*
• Anterolateral margin with 5 teeth ..... *Thalamita*

Podophthalmus vigil (Fabricius, 1798)

Diagnosis: Carapace distinctly broader than long; anterior margin much broader than posterior margin, posterolateral margin converging strongly towards narrow posterior carapace margin; epibranchial spine very small behind large orbital angle. Orbit very broad, transversely grooved, eye-stalk very long, reaching to or extending beyond edge of carapace. Chelipeds long and slender; dactyls shorter than palms; palm with 3 granulated carinae; carina on upper margin terminating in spine, lower margin granulated, 1 strong spine near apex of carpus; carpi with strong spine on inner angle and another smaller spine on outer angle; meri with 3 spines on anterior border and 2 spines on posterior border. Natatory legs with fringing hair on posterior surface, meri with distal spine on anterior border. Photo: preserved specimen.

Color: Unknown.

Size: Maximum recorded carapace width 80 mm.

Habitat: Sandy or muddy substrate in offshore waters.

Distribution: Indo-West Pacific.

Portunus (Xiphonectes) gracilimanus (Stimpson, 1858)

Diagnosis: Carapace slightly convex and finely pubescent, surface covered with conspicuous ridge. Front with 4 subacute teeth, median pair slightly more prominent; 9 anterolateral teeth, last teeth approximately twice length of others. Lateral margin with dense setae. Chelipeds very elongate; fingers slender, compressed, ending very acutely, with tips bent slightly outwards; palms with 5 longitudinal ridges, 2 innermost terminating in long spine, 1 strong spine near apex of carpus; carpi with 1 strong spine each on outer angle and inner angle, upper surface with several ridges; meri with 4 strong spines on anterior border, 2 spines on posterior border. Meri of natatory legs with distal spine on posterior border. Photo: preserved specimen, left cheliped, second and fourth of left and right pereiopods missing.

Color: Unknown

Size: Maximum recorded carapace width 40 mm.

Habitat: Sandy substrate in offshore waters.

Distribution: East coast of India, Andaman, Hongkong, Malaysia, New Guinea and Australia.

Portunus (Xiphonectes) hastatoides Fabricius, 1798

Diagnosis: Carapace pubescent, covered with tiny tubercles, regions well defined; anterolateral margin with long setae. Front cut into 4 teeth, median much smaller and more acute than lateral teeth. Anterolateral margin with 9 teeth, last tooth strong and long, directed outward. Third maxillipeds with anterolateral angle strongly produced and with tuft of setae. Chelipeds elongate; upper surface of palms with 5 carinae, outermost terminating in spine, strong spine near apex of carpus; inner most carina continue to fixed finger; carpi with 1 spine each on inner and outer angle, outer surface with granulated carina; meri with 2 spines on posterior border and 4 spines on anterior border. Posterior and anterior border of meri and upper margin of palms of chelipeds with dense setae. Meri of natatory legs with posterior border serated distally. Photo: preserved specimen.

Color: Unknown.

Size: Maximum recorded carapace width 30 mm.

Habitat: Sandy-mud substrate in estuarine area, 0 to 30 m depth.

Distribution: Japan, Philippines, Singapore, Torres Strait and northern Australia.

Portunus (Portunus) pelagicus (Linnaeus, 1758)

Diagnosis: Carapace broad, regions distinct, transversely diamond-shaped; each anterolateral margin armed with 8 serrated teeth and long epibranchial tooth. Front with 4 teeth. Carapace surface granulated, frequently with short but dense pubescens between granules. Chelipeds elongate, massive, spinous and ridged. Upper surface of dactyl with 3 strong carinae; palms with 3 carinae, granular; middle and inner carina terminating in spine; carpi with 1 spine each on inner and outer angle; posterior margin of meri spinous, anterior margin with 4 sharp spines. Natatory legs with fringing hair on posterior surface.

Color: Carapace, chelipeds and ambulatory legs distinctly bluish with white irregular lines and spots in male; dark green in female and juvenile.

Size: Maximum recorded carapace width 150 mm.

Habitat: Fully aquatic, found in estuary and mangrove as well.

Distribution: Widely distributed in the Indo-West Pacific.

Portunus (Portunus) sanguinolentus (Herbst, 1783)

Diagnosis: Carapace broad, finely granulated anteriorly, becoming smooth posteriorly; region discernible. Front cut into 4 lobes, acute in larger specimens. Anterolateral margin with 9 teeth, last teeth 2 to 3 times larger than preceding teeth, directed laterally. Male chelipeds elongate; upper surface of palm with 3 smooth carinae, inner one terminating in spines, and with well-marked carinae along middle of inner and outer surface of palm; fingers very long carpi with 1 tooth each on inner and outer angle; border of meri with 3-4 sharp spines. Natatory legs with fine fringing hair, without spines or spinules. Photo: right cheliped and second pereiopod missing.

Color: Carapace green mottled with brown, 3 prominent reddish dark brown spots on posterior third of carapace. Chelipeds bluish green, fingers red; ambulatory legs blue with red setae.

Size: Maximum recorded carapace width 100 mm.

Habitat: Mud to muddy-sand substrate in estuary.

Distribution: Indo-West Pacific, from east coast of Africa across Indo Pacific to Hawaii.

Scylla olivacea (Herbst, 1796)

Diagnosis: Carapace narrowly ovate, evenly convex, smooth, shining without granules and hairs; gastric, cardiac, intestinal and branchial regions demarcated by wide, shallow furrows. Front with 4 low rounded teeth. Anterolateral border serrated with 9 subequal teeth. Chelipeds stout and large, with sharp teeth on cutting edges of smaller chela, and with molar teeth on cutting edge of larger chela; outer margin of carpus with small blunt prominent spine ventro-medially and reduced second spine may be present dorsodistally in juvenils and young specimens.

Color: Carapace greenish dark brown. Chelipeds and ambulatory legs vary from red through brown to brown/black, without dark-colored polygonal patterning.

Size: Maximum recorded carapace width 150 mm.

Habitat: Found in crevices in mangrove forest.

Distribution: Widely distributed in the Indo-West Pacific.

Charybdis (Charybdis) anisodon (De Haan, 1835)

Diagnosis: Carapace smooth, marked by faintly granular transverse carapace ridges. Front with 6 rather truncate teeth; median teeth widest; submedian teeth weakly directed outward; lateral teeth directed forward, bluntly triangular, separated from submedian by deep V-shaped notch. Supraorbital angle not tuberculated. Anterolateral margin armed with 6 teeth, first obtusely triangular, second smaller, positioned close to first and third teeth; last tooth elongate and large, projecting laterally beyond preceding tooth. Chelipeds smooth and slightly unequal; palm with 2 spines on upper surface; outer surface with 2 indistinct longitudinal ridges on median part and 1 distinct ridge close to lower margin, continuing to immovable finger; carpi with 1 spine on inner angle and 3 spinules at outer angle; anterior margin of meri armed with 2 spines. Meri of natatory legs with 1 strong spine on posterior border. Photo: preserved specimen, second and third left pereiopods and second right pereiopod missing.

Color: Unknown

Size: Maximum recorded carapace width 50 mm.

Habitat: Muddy substrate of estuarine area.

Distribution: Indo-West Pacific from Red Sea, to China, Japan, Philippine, Indonesia and New Caledonia.

Charybdis (Charybdis) annulata (Fabricius, 1798)

Diagnosis: Carapace smooth, and convex. Front with 6 teeth; median teeth and submedian teeth broadly triangular; lateral teeth narrowest, acutely triangular, separated from submedian by deep V-shaped notch. Anterolateral margin armed with 6 teeth, first and second smaller, third teeth largest; last tooth elongate and spiniform. Chelipeds smooth and slightly unequal; palm with 3 spines on upper surface; outer surface with 2 smooth costae, lower surface smooth; carpi with 1 spine on inner angle and 3 spinules at outer angle; anterior margin of meri armed with 3 spines and 1 spinule at distal end. Propodi of natatory legs serrated on posterior border, carpi and meri 1 spine on posterior border.

Color: Bluish grey or bwownish grey.

Size: Maximum recorded carapace width 45 mm.

Habitat: Muddy substrate of estuarine area.

Distribution: Indo-West Pacific from Red Sea, to China, Japan, Malaysia and Indonesia.

Charybdis (Charybdis) callianassa (Herbst, 1789)

Diagnosis: Carapace surface shortly pilose; cardiac ridge faintly granular; 6 frontal teeth, median projecting beyond submedian; submedian rounded, lateral teeth narrowest, obtus, separated from submedian by deep notch. Anterolateral margin with 6 teeth with serrated borders, first tooth notched, second to fifth increasing in size, last spiniform, projecting laterally beyond preceding tooth. Chelipeds swollen, surface finely pubescent; fingers slender, slightly longer than palm; palm with 3 spines on upper surface, outer surface 3 smooth costae, inner surface with median costa, lower surface smooth; carpi with strong spines on inner angle and 3 spinules at outer angle; anterior border of meri with 2 spines, posterior border finely granular.

Color : Brown Greenish

Size: Maximum recorded carapace width 30 mm.

Habitat: Sandy-mud substrate in estuarine area.

Distribution: India, Pakistan, China, Thailand, Malaysia, Singapore, Indonesia and Australia.

Charybdis (Charybdis) feriatus (Linneaus, 1758)

Diagnosis: Carapace convex and smooth, with transversal granular ridge on protogastric, mesogastric, metagastric and epibranchial. Front with 6 teeth, triangular and subequals. Anterolateral margin with 6 teeth; first teeth truncate, second teeth rounded, third to fifth teeth increasing in size broadly, last teeth small directed laterally. Chelipeds unequal; fingers of left cheliped slender, as long as palm; palm with 4 spines on upper surface, outer surface with 2 smooth costae, inner surface with median costae, lower surface smooth; carpus with 3 spinules on outer angle and 1 strong spine on inner angle; anterior border of merus with 3 strong spines. Propodi of natatory legs smooth on posterior border; meri with spine on posterior border.

Color: Chelipeds and pereopods cream with red-brown pattern; carapace with large reddish brown longitudinal stripes.

Size: Maximum recorded carapace width 60 mm.

Habitat: Sandy to sandy mud substrate in estuarine near mangrove area.

Distribution: From East coast of Africa to Hongkong, Taiwan, Malay Archipelago and Australia.

Charybdis (Charybdis) hellerii (A. Milne Edwards, 1867)

Diagnosis: Carapace pilose; 6 frontal teeth, median teeth more or less barrel-shaped with rounded tip; submedian teeth narrowly triangular, sharp at tip; lateral teeth acutely triangular, narrow, separated from submedian by deep V-shaped notch. Anterolateral margin with 6 teeth, first and second subequal in size, last elongate and spiniform, projecting beyond preceding tooth. Chelipeds stout, surface finely pubescent; palm with 5 spines on upper surface, outer surface with 3 smooth costae; carpi with strong spine on inner angle and 3 spinules at outer angle; anterior border of meri with 3 spines and a spinule at distal end. Carpi and meri of natatory legs armed with 1 spine at distal end of posterior margin; posterior border of propodi serrated.

Color: Carapace bluish green, inner surface of chelipeds light browm, fingers dark brown.

Size: Maximum recorded carapace width 45 mm.

Habitat: Sandy substrate in estuarine area.

Distribution: Mediterranean, East Africa, Red Sea, Persian Gulf, Pakistan, India, Andaman, China, Japan, Malaysia, Singapore, Indonesia, Australia and New Caledonia.

Charybdis (Charybdis) natator (Herbst, 1789)

Diagnosis: Carapace broader than long, surface slightly convex, setose. Front with 6 teeth, median and submedian truncate, lateral acute. Anterolateral margin with 6 teeth, first teeth truncate, second rounded, third to fifth triangular, increasing in size toward posterior; sixth teeth small, directed anterolaterally. Chelipeds unequal, granular and pilose; anterior border of merus with 3 spines, posterior border granulated; carpus with 1 strong spine on inner border and 3 spinules on outer face. Palm with 4 spines on upper surface and 1 spinule at distal end of outer border; lower surface with transverse squamiforme ridges; fingers stout, deeply grooved. Propodus of natatory legs serrated on posterior border. Photo: preserved specimen.

Color: Setose dorsal surface brownish, granules bright red. Ventral surface bluish mottled with white and pale red (Wee & Ng, 1995).

Size: Maximum recorded carapace width 80 mm.

Habitat: Sand and sandy mud substrate in intertidal area.

Distribution: From Red Sea, east coast of Africa and Indian Ocean to Malay Archipelago, Japan and Australia.

Charybdis (Goniochellenus) truncata (Fabricius 1798)

Diagnosis: Carapace densely pilose; metagastric, cardiac and mesobranchial regions marked with granular patches; granules on orbital border, frontal and anterolateral teeth. Six frontal teeth, medians prominent, submedian rounded, laterals acute and narrowed, separated from submedian by deep notch. Anterolateral margin with 6 subequal teeth; first and second teeth closely set, third to last decreasing in size. Chelipeds unequal, covered by granular squamiform markings; dactyls as long as palm; palms with 7 costae and 4 spines; carpi with 3 spines on outer angle and 1 strong spine on inner angle; anterior border of meri with 3 spines. Propodi of natatory legs serrated on posterior border; meri with 1 strong distal spine on posterior border. Penultimate segment of male abdomen with lateral border strongly convex. Photo: preserved specimen.

Color: Carapace dirty green, legs with transverse bars or patches of reddish brown, ventral surface white (Wee & Ng, 1995).

Size: Maximum recorded carapace width 35 mm.

Habitat: Sandy-mud in estuarine area, to 30m depth.

Distribution: Indian Ocean to China, Japan and Malay Archipelago and Australia.

Thalamita crenata (Latreille, 1829)

Diagnosis: Carapace surface smooth, scattered short setae on lateral region. Front with 6 lobes, broadly rounded, median lower, lateral narrowest. Anterolateral margin with 5 subequal teeth, fourth tooth slightly smaller than fifth. Basal segment of antennal peduncle larger than orbit with low granulated crest. Chelipeds unequal; palm smooth, upper surface with 5 spines including spine at wrist articulation; carpi with 1 strong spine at inner angle and 3 spinules at outer angle; meri with 3-4 strong spines on anterior margin. Propodi of natatory legs serrated along distal half of posterior border.

Size: Maximum recorded carapace width 70 mm.

Habitat: Estuary, on muddy substrate and in mangrove area.

Distribution: From Indian Ocean across Malay Archipelago to Australia, Tuamotu and Hawai.

Superfamily Ocypodoidea

The superfamily Ocypodoidea include nine families that primarly intertidal. The members of this superfamily make burrows in the intertidal flat, in sandy or muddy substrate and in mangrove environment. Five families were found in the Mimika region.

Key to the family of the superfamily Ocypodoidea (modified from Serène, unpublished)

1 • Antennules longitudinally folded with reduced flagella. Interantennular septum broad. Hairy tufts marking accessory opening of branchial chamber at articulation with border of carapace of some pereopod or abdomen 2
• Antennules transversely obliquely folded with normal flagella. Interantennular septum remarkably narrow. No hairy tufts marking accessory openings of branchial chamber 4

2 • Carapace quadrangular or trapezoid; no tooth or incision behind exorbital angle; orbit deep and broad. Hairy tufts between coxae of pereopod 3 and 4. Male G1 nearly straight with subdistal tufts of setae concealing chitinous apical process .... Ocypodidae
• Carapace subglobular or subquadrate; generally an incision marked behind orbital angle, orbit narrow hairy tufts between coxae of pereopod 2 and 3; Male G1 slender, curved at tip ..... Dotillidae

3 • Antennular fossae opening in orbital hiatus. Hiatus more or less developed between third maxillipeds. Male G1 straight with subdistal hairy tuft concealing short chitinous process ..... Macrophthalmidae
• Antennular fossae separated from orbital hiatus. No hiatus between third maxilliped. Male G1 with distal half recurved longitudinally; without hair concealing long apical process..... Camptandriidae

Family Ocypodidae - Fiddler Crabs

Ocypodid crabs are typical inhabitants of tropical intertidal shore, live gregariously on sandy beaches, muddy sand or mud flat of estuaries or mangrove forest. They remain buried when their habitat is submerged during high tide and perform their activities such as feeding, courting, fighting and making burrows during low tide. The males wave their major cheliped to attract females or to threaten other males. They feed on detritus and small fauna such as worms.

Fiddler crabs are characterized by the enormous size of male major cheliped, minor cheliped and both chelipeds in female are small. Carapace is sub quadrangular to pentagonal, deep and strongly vaulted, never flattened. The orbit is long with long eyestalk. Major cheliped with wide diversity of form. Ambulatory legs are moderately flattened.

Ocypodidae has worldwide distribution but is most diverse in the tropics. In the Indo West Pacific, about 133 species in two genera and eight subgenera are recognized. In Mimika region 5 species belonging to the genus *Uca* sub-genera *Australuca*, *Gelasimus*, *Paraleptuca* and *Tubuca* were found in mangrove and on sandy-mud beaches of estuarine areas.

Uca perplexa

Uca (Tubuca) coarctata (H. Milne Edwards, 1852)

Diagnosis: Carapace smooth, exorbital angle moderatately to strongly acute and produced. Front narrow, frontal groove deep and narrow. Suborbital crenellation stronger towards exorbital angle; orbital floor with accessory granules behind suborbital crenellation. Eyestalk thin. Dactyl of male major cheliped longer than palm, covered with microscopic granules, median groove long and distinct, large subdistal tooth. Palm covered with strong and weak granules, pollex with long distinct median groove; triangular depression at pollex base. Minor cheliped very small, distal blunt serration on cutting edges of fingers.

Color: Carapace very often black, sometimes with lighter brown, major cheliped red on lower part; dactyl and upper part of palm white.

Size: Carapace width 30 mm.

Habitat: Muddy substrate near river mouth and estuary associated with mangrove.

Distribution: Philippines, New Guinea, northern Australia, Fiji and New Caledonia.

Uca (Paraleptuca) perplexa (H. Milne Edwards, 1837)

Diagnosis: Carapace smooth, exorbital angle acute, produced; anterolateral margin very short. Front broad. Orbit oblique, eyebrow short and narrow, orbit floor without tubercles; suborbital crenellations minute in inner half, large near external angle. Palm and carpus of male major cheliped with minute tubercles; tubercles stronger on upper border of dactyl and lower border of fixed fingers, and on upper and lower borders of palm; oblique ridge of strong but thin tubercles on inner surface of palm. Fingers long and compressed, longer than palm, without longitudinal grooves, wide gape in between. Minor chelae with weak serration on cutting edge, wide gape between fingers, dactyl compressed, longer than palm.

Color: Male major cheliped white, carapace dark grey.

Size: Maximum recorded carapace width 10 mm.

Habitat: Muddy sand substrate in mangrove area, and river mouth

Distribution: West Pacific to northern Australia.

Uca (Australuca) seismella Crane, 1975

Diagnosis: Carapace smooth, exorbital angle almost right angle, slightly produced; anterolateral margin definite. Front narrow; frontal groove broad and shallow. Orbital floor without tubercles or granules; suborbital crenelation present in female. Eyestalks thin. Major cheliped with dactyl longer than palm; 1 long furrow on dactyl, cutting edge with 2 enlarged teeth, one near base, one beyond level of tubercles surmounting pollex projection. Palm with small tubercles, stronger near dorsal margin; strong oblique ridge on inner surface of palm; fingers compressed covered with minute granules externally; fixed finger without furrow. Small cheliped in both sex with 1 strong subdistal tooth on both cutting edges, following by smaller teeth; fingers longer than palm. Male gonopod long with tubular tip.

Size: Maximum recorded carapace width 16 mm.

Habitat: Mud substrate near river mouth in the mangrove area.

Distribution: Northern Territory and Queensland, Australia.

Uca (Paraleptuca) triangularis (A. Milne Edwards, 1873)

Diagnosis: Carapace smooth, exorbital angle strongly produced; anterolateral margin absent. Front moderately broad. Orbit strongly oblique; floor of orbit with tubercles. Suborbital crenellation distinct, larger toward anteroexternal angle. Dactyl of male major cheliped longer than palm, with median longitudinal furrow; palm microscopically tuberculate. Merus of minor chelae with transverse rows of tubercles on outer surface and row of tubercles on posterior and anterior margins; fingers with minute teeth. Male gonopod with long and slender flanges extend throughout the length of corneous shaft. Photo: preserved specimen.

Color: Male major cheliped white with browns spots on palm; carapace dark brown with light brown tranverse lines.

Size: Maximum recorded carapace width 17 mm.

Habitat: Occurs in brackish water along river bank in mangrove area.

Distribution: Eastern India, across Malay Archipelago to New Caledonia and Ryukyu island.

Uca (Gelasimus) vomeris McNeill, 1920

Diagnosis: Carapace smooth, exorbital angle acute; anterolateral margin very short. Front narrow; frontal groove widely triangular. Sub-orbital crenelation large and distinct, extending across entire orbit; no tubercles on orbital floor. Dactyl of male major cheliped longer than palm, without distinct furrow on outer surface, broad and flat. Palm with large tubercles; pollex broad and compressed with long median groove extending most of its length; triangular depression at base, outer surface nearly smooth or with minute tubercles near cutting edge and lower margin. Serration absent or nearly so on small cheliped in both sexes.

Color: Carapace dark brown or dark grey. Palm and pollex of male major cheliped orange, upper margin and dactyl white.

Size: Maximum recorded carapace width 17 mm.

Habitat: Sandy-mud or mud substrate in mangrove area.

Distribution: Australia, and Papua.

Family Dotillidae - Soldier Crabs

The family is characterized by a carapace that is subglobose or quadrilateral; anterolateral margin with tooth or identation behind exorbital angle. Front variable from narrow to moderately broad. Eyestalk is usually elongate. Third maxillipeds are broad, completely closing buccal cavern. Chelipeds are symmetrical or slightly asymmetrical. Brush of long setae edging pouch leading into branchial cavity between bases of second and third pereopods may be present or completely lacking. Meri of some pereopods or of all pereopods with or without a tympanum.

Dotilla myctiroides in the sandy shore of Kamora Estuary

Dotillid crabs are essentially littoral, mostly found associated with mangrove environments or estuaries with low salinity. Currently 9 genera of 61 species are found world wide. In the Mimika region 4 species belonging to 3 genera were found in upper estuary in mangrove forest. *Dotilla myctiroides* makes burrow on sandy shore. They go in their burrow very fast when disturbed. The species of *Ilyoplax* in Mimika region were found associated with thalassina mound, they wave both chelipeds showing light brown color of the inner surface of the chelipeds and therefore are easily spotted among dark brown mud. The present *Scopimera gordonae* or sand bubbler is easily recognized by the occurrence or balls of sand (sand bubble) on sandy shore.

Sand Bubbler (*Scopimera gordonae*) and balls of sand

Dotilla myctiroides (H. Milne Edwards, 1852)

Diagnosis: Carapace longer than broad, spherical, strong spine on edge of each hepatic region. Posterior border of carapace with dense, rigid setae. Front deflexed, strongly produced centrally, upper surface slightly concave centrally. Third maxillipeds large, exognath absent, ischium larger than merus. Chelipeds slender, equal; dactyls longer than palms with strong tooth proximally; propodi with 4 longitudinal ridges: 2 ridges on dorsal surface of palm, another 2 ridges continue to fixed fingers; carpi, meri and ischia each with strong distal spine on ventral margin. Dorsal margin of carpi and posterior and anterior margins of meri of ambulatory legs serrated, dorsal and ventral margins of dactyls and propodi with sparse setae. Male and female abdomen wide. Photo: preserved specimen.

Color: Light brown with longitudinal blue stripe on dorsal surface of carapace.

Size: Maximum recorded carapace width 11 mm.

Habitat: Sandy mud flat of mangrove area near river mouth.

Distribution: Southeast Asia.

Ilyoplax dentatus Ward, 1933

Diagnosis: Carapace sub-rectangular, regions poorly defined, dorsal surface smooth or microscopically granular. Front relatively broad with median emargination. Exorbital angle rounded, posteriorly followed by weak notch. Supraorbital border sinuous, strongly sloping backward, smooth. Infraorbital border project beyond supraorbital with small granular on its margin. Fifth segment of abdomen constricted near base. Chelipeds equal, massive; granules along lower margin of palm, strong spine on inner angle of carpi. Propodi and carpi of second pereopods with dense setae on dorsal margin.

Color: Brownish grey, chelipeds light grey or light brown.

Size: Maximum recorded carapace width about 5 mm.

Habitat: Mud substrate in dense mangrove forest.

Distribution: Previously known only from Eastern Australia.

Ilyoplax strigicarpus Davie, 1990

Diagnosis: Carapace sub-rectangular, regions poorly defined, dorsal surface smooth or microscopically granular with sparsely small hair. Front relatively broad with blunt median prominence. Exorbital angle pointed, posteriorly followed by U-shaped notch. Supraorbital border sinuous, sloping backward, minutely granular on central convexity. Infraorbital border project beyond supraorbital with tooth capped by molar-like pectination on anterolateral edge. Fifth segment of abdomen constricted near base. Chelipeds equal, long and massive, propodi with 2 granular ridges along lower margin starting from fixed finger, 1 ridge reaches mid length, other ridge reaches base of palm, carpi greatly elongated, internal proximal angle with obtuse tooth followed by ridge along proximal lower edge. Carpi and propodi of first and second pereopods covered with dense hair.

Color: Carapace and ambulatory legs brown, chelipeds yellowish brown.

Size: Maximum recorded carapace width 5 mm

Habitat: Soft mud substrate in mangrove area near estuary.

Distribution: Previously known from northern Australia.

Scopimera gordonae Serène & Moosa, 1981

Diagnosis: Carapace broader than long, regions indistinct. Front narrow, upper surface slightly concave centrally. Third maxillipeds broad, merus much larger than ischium. Male chelipeds long; dactyl as long as palm with string rounded teeth on cutting edge, dorsal surface of palm minutely granulous, carpi unarmed, almost 2 times longer than broad. Ambulatory legs long, lateral surface of dactyls with longitudinal ridge medially. Base of second and third pereiopods with dense setae. Abdomen 7 segmented, fifth segment diminished at base, length of fifth segment same as length of third and fourth segments together. Photo: preserved specimen.

Color: Brownish grey.

Size: Maximum recorded carapace width 10 mm.

Habitat: Muddy sand substrate in mangrove area near river mouth.

Distribution: Ambon and Papua.

Family Macrophthalmidae - Sentinel crabs

Sentinel crabs are predominantly littoral, burrow in soft mud substrate in mangrove or on mudflat near river mouth and estuarine areas. Burrows of these crabs are easily recognized by the rectangular shape of holes opening on mud substrate. Sentinel crab or genus *Macrophthalmus* is characterized by rectangular shape of carapace which is moderately depressed, with well demarcated regions. Anterolateral margin are either straight or slightly arched, usually with 1 or several teeth. Front is variable, narrow or moderately broad, never very broad. Orbit is long and narrow with long eyestalk, cornea reaches or beyond bases of exorbital angle. Third maxillipeds sometimes are not completely closing buccal cavern, but never forming rhomboidal gap; exopods are visible, flagellum absent. Chelipeds are subequal. The family contains 4 genera and 68 species, inhabits mostly sandy mud substrate of intertidal area. In the Mimika region two genera with 4 subgenera and 6 species were found in soft mud substrate in mangrove area near river bank.

Habitat *Macrophtalmus* spp. with typical rectangular holes

Ilyograpsus paludicola Rathbun, 1909

Diagnosis: Carapace slightly larger than long, dorsal surface microscopically granular, regions well-defined. Frontal margin slightly bilobed, post frontal lobes separated by rather deep groove. Anterolateral margin of carapace with 4 teeth including exorbital angle; first, third and fourth teeth acute, second teeth obtuse. Posterolateral margin of carapace longer than anterolateral margin. Chelipeds smooth, except denticulation on anterior margin of meri. Ambulatory legs slender, third pereopods 2.5 times as long as carapace length, meri with strong subdistal spine and with scarce long setae on anterior and posterior border. Propodi and carpi of fifth pereopods with short hair on anterior and posterior borders.

Color: Dark brown to light brown.

Size: Maximum recorded carapace width 10 mm.

Habitat: Mangrove swamp.

Distribution: Madagascar, Thailand, Singapore, Malaysia,and Queensland, Australia

Macrophthalmus (Mareotis) definitus Adams & White, 1848

Diagnosis: Carapace with scattered granules; 3 anterolateral teeth including exorbital angle; third teeth very small and pointed. Front deflexed, straight or faintly bilobed, with deep median furrow. Chelipeds equal; dactyls curved, outer surface with microscopical granules, cutting edges with small but distinct tooth near base, large granules distally; upper margin fringe with hair. Fixed fingers slightly deflexed, outer surface smooth, cutting edges with large crenulated tooth; palms minutely granular, no longitudinal ridge, inner surface of palms hairy with small granules near lower margin; upper margin of carpi with irregular granules, lower margin with large granules. Pereopods 2-4 covered with short dense setae on propodi, carpi and meri, concealing subdistal spine on meri; dactyls with fringe of setae on upper and lower margin; pereopods 5 with sparse hairs on anterior and posterior border.

Color: Dark brown.

Size: Maximum recorded carapace width 15 mm.

Habitat: Mudflats in mangrove and estuarine areas.

Distribution: Phuket, Thailand; Hongkong, Solomon island; Maluku, Indonesia; Queensland, Australia.

Macrophthalmus (Mareotis) pacificus Dana, 1851

Diagnosis: Carapace broader than long; 3 anterolateral teeth including exorbital angle. Carapace surface smooth, shining; branchial region with 2 short longitudinal granular ridges on posterior part. Front narrow, with deep median groove, margin smooth to slightly tuberculate. Ocular peduncle slightly falling short of tip of exorbital tooth. Palms of chelipeds with minute granules, larger and stronger near upper margin; no trace of longitudinal ridge on fixed finger and palm in adult specimen; inner surface with mat of hair distally, continue to fixed finger; meri with mat of hair on lower surface. Pereopods 2-5 with scarce hairs on posterior and anterior margins; anterior border of meri with subdistal spine.

Color: Carapace mottled blue and brown, chelipeds and pereopods light blue.

Size: Maximum recorded carapace width 20 mm.

Habitat: Mud substrate in mangrove area.

Distribution: India, Malaysia, New Guinea, Australia and Samoa.

Macrophthalmus (Paramareotis) erato De Man, 1888

Diagnosis: Carapace surface smooth centrally, with small, scattered granules on branchial and hepatic regions and with variable short hairs; 2 large and 1 small anterolateral teeth. Front narrow. Upper orbital border tuberculate; lower orbital border with 1 large triangular protuberance. Chelipeds subequal; dactyl curved, fixed finger straight, inner surface of fingers with thick hair. Outer surface of palm covered with small pointed granules; inner surface covered with thick hairs except near lower margin which armed with 1 or 2 granules. Upper margin of carpi with 2 or 3 large tubercles, inner surface with about 8 large pointed tubercles. Inner surface of meri with short horny ridge about one fifth length of merus, situated close to inner margin; outer surface covered with thick hair. Meri of pereopods with thick hair on upper margin; lateral surface of propodi, carpi and meri of third pereopods heavily haired. Photo: left second pereiopod missing.

Color: Uniformly dark brown.

Size: Maximum recorded carapace width 10 mm.

Habitat: Muddy sand substrate in mangrove area near river mouth.

Distribution: Bay of Bengal, Mergui Archipelago, Thailand, China, Vietnam, Malaysia, Philippines and Indonesia.

Macrophthalmus (Macrophthalmus) brevis (Herbst, 1804)

Diagnosis: Carapace covered by small and medium sizes rounded granules, branchial regions with 3 raised clumps of granules; 3 anterolateral teeth including exorbital angle; third teeth small and pointed. Front deflexed, straight or slightly bilobed. Chelipeds equal; dactyls curved, outer surface finely granular especially near upper margin, inner surface with thick hair. Fixed fingers slightly deflexed, outer surface smooth, cutting edge with large crenulated tooth; palms elongate, granular, large granular on upper margin; longitudinal ridge near lower margin, inner surface of palms hairy, granules on median and lower region and with large spine proximally; upper margin of carpi with irregular granules, lower margin with large granules. Dactyls of pereopods 2-4 with short hair on upper margin; pereopods 5 with fringe of setae on upper and lower margin.

Color: Dark grey mottled with brown.

Size: Maximum recorded carapace width 33 mm.

Habitat: Mudflats in mangrove and estuarine areas.

Distribution: Malay Archipelago, Indonesia and Australia.

Macrophthalmus (Macrophthalmus) parvimanus Guérin-Méneville, 1834

Diagnosis: Carapace about twice as broad as long; lateral margin with 3 anterolateral teeth including exorbital angle. Exorbital angle large and pointed, separated from second smaller anterolateral teeth by narrow incision; third anterolateral teeth very small or absent. Carapace surface smooth and shiny, clump of granules on branchial region. Ocular peduncles long and narrow, extending as far as or beyond tip exorbital angle. Front deflexed, slightly bilobed, with shallow median furrow. Chelipeds small, same as in female; outer surface of palms covered with tubercles, longitudinal ridge close to lower margin; inner surface covered with thick hair; posterior and anterior margins of meri with row of tubercles and fine long hair. Pereopods long, meri of third and fourth pereiopods with distal spine on upper margin; scarce hair on upper and lower margins. Photo : left cheliped and dactyl of third pereoiopod missing.

Color: Unknown

Size: Maximum recorded carapace width 12 mm.

Habitat: Sandy mud substrate in mangrove near estuary.

Distribution: Gulf of Manaar, Seychelles, Mauritius, Madagascar, Mahe, Aldabra, Phuket.

Macrophthalmus (Venitus) latreillei (Desmarest, 1822)

Diagnosis: Carapace broader than long, surface heavily granular with variable amount of hair; 3 anterolateral teeth including exorbital angle. Front deflexed, narrow with small granules along margin. Ocular peduncles long and narrow; cornea extending to base of exorbital angle. Male chelipeds equal; dactyls curved, outer surface smooth, cutting margin with large, quadrangular, crenulated tooth near base, distally with small number of widely spaced cylindrical granules; upper margin of palms with row of large granules, surface smooth without longitudinal ridge near lower margin; fixed finger undeflexed except on large specimens, cutting margin without differentiated tooth; inner surface of propodi and dactyls heavily hairy; carpi granular, inner surface hairy; meri with long hair on lower and upper margins and inner and outer surfaces. Pereopods with fringe hair on upper and lower margins.

Color: Carapace and chelipeds dirty yellowish brown, hair dark brown.

Size: Carapace breadth 38 mm.
Habitat: Mudflat in mangrove and estuarine area.

Distribution: From South Africa to India, Japan Philipinnes, Malaysia, Indonesia, Australia and New Caledonia.

Family Camptandriidae

The camptandriid crabs have a carapace that is broader than long or slightly longer than broad, the anterolateral margins entire with weak lobes or distinct teeth. Front is not less than half of orbital width, deflexed. Eyestalks usually are not slender, short. Third maxillipeds sometimes placed slightly apart, usually meeting in the centre, but never separated by rhomboidal gape, with merus sometimes fused to ischium. Chelipeds more or less are equal; male chelipeds are large, truncate or triangular tooth always present on movable finger. Chela of female is always weak, with spatula tip which is usually setose. Male abdomen with varying degree of fusion among segments, never with all segments freely mobile. Segment 1 and 7 are always free. Male first gonopod is strongly recurved, more or less elaborately lobed, and often swollen; male second gonopod is very short.

Generally the family Camptandridae are small-sized, drably coloured, inhabit muddy bottom between high and low tidal marks in the mangrove and estuarine environment. These crabs are cryptic, covered by mud and debris, their camouflage enhanced by dense hair on their legs and carapace. Currently this family contains 39 species in 17 genera, distributed in the Indian, Pacific and Atlantic oceans but no known species from the American coast. Four species of this family were found in Mimika region in high mangrove area.

Baruna trigranulum (Dai & Song, 1986)

Diagnosis: Carapace sub-quadrangular, broader than long. Regions clearly demarcated, covered with numerous small, stiff, short hairs. Front sinuous. Anterolateral margin tuberculate, exorbital angle strong spine. Third maxillipeds broad, long and dense hair on dactyls, propodi and carpi, exopods with well developed flagella. Palms of chelipeds swollen, upper surface toward upper margin pubescens, dactyls with large tooth proximally, fixed fingers with small teeth. Ambulatory legs stout, dorsal and ventral margins with long setae, lateral surface pubescens. Posterior margin of meri of second to fifth with stout spines, granules and tubercles arranged in a U-shaped structure, anterior margin never serrated. Male abdominal segments 2-3 fused.

Color: Carapace light brown with dark brown patch, chelipeds and ambulatory legs dark brown. The animal is always covered by mud.

Size: Maximum recorded carapace width 7 mm.

Habitat: Muddy substrate in mangrove environment.

Distribution: Phuket, Singapore, Malaysia and northern Australia.

Paracleistotoma laciniatum Rahayu & Ng, 2003

Diagnosis: Carapace broadly quadrangular, 1.3 broader than long, region indistinct, carapace surface smooth, slightly pubescens. Anterolateral margin granular with 3 broad, obtuse anterolateral teeth. Front slightly bilobed, separated by shallow V-shaped groove. Orbit broad, sinuous, with numerous long setae. Third maxillipeds broad, completely covering buccal field, ischium broadly rectangular, longer than merus. Exopod with well developed flagella. Chelipeds slender; dactyls with large molariform tooth on basal edge, tip of fingers spoon-shaped; surface of palms and carpi smooth, setose on upper and lower margins. Ambulatory legs long, setose especially on upper and lower margins, dactyls and propodi smooth; anterior and posterior margin of meri with granules. Male abdominal segment 2-5 fused, suture indistinct. Long and short setae on external edge of male first gonopod, distal recurved portion large and globular with long, cylindrical process, tip truncate, covered by spinules. Photo: specimen cleaned from mud on right side.

Color: Light to dark brown.

Size: Maximum recorded carapace width 8 mm.

Habitat: Muddy substrate in high mangrove environment.

Distribution: South coast of Papua.

Paracleistotoma mcneilli (Ward, 1933)

Diagnosis: Carapace quadrangular, broader than long, regions indistict, hepatic and branchial regions each with 1 large tubercle. Anterolateral margin cristate, cut into 3 lobes. Front entire, upper surface slightly concave centrally. Third maxillipeds broad, not completely covering buccal field, meri with rounded edge, ischia as long as meri. Exopods narrow, with well developed flagella. Chelipeds small, equal, surface smooth, tips of fingers spoon shaped, dactyls with large molariform tooth proximally, fixed fingers with small teeth distally. Ambulatory legs long, densely setose, third and fourth longest. Dactyls of all legs slender, slightly shorter than propodi. Abdominal segments 2-5 fused, suture indistinct. Male first gonopod with distal part sharply bent with 2 terminal processes (1 process with curved tip).

Color: Carapace dark brown, front and anterolateral margins orange. Chelipeds and ambulatory legs light brown, fingers of chelipeds orange.

Size: Maximum recorded carapace width 8 mm.

Habitat: Muddy substrate between high and low tide mark in mangrove and estuarine environment.

Distribution: Queensland, Australia and South coast of Papua, Indonesia.

Paracleistotoma quadratum Rahayu & Ng, 2003

Diagnosis: Carapace rectangular, broader than long, region indistinct, carapace surface smooth, slightly pubescens. Anterolateral margin entire. Front weakly bilobed, upper surface slightly concave centrally. Orbital margin unarmed, with numerous short setae. Third maxillipeds broad, completely covering buccal field, ischium broadly rectangular, longer than meri. Exopod with well developed flagella. Chelipeds equal, surface of carpus and palm smooth. Tip of finger spoon-shaped, dactyl with large molariform tooth on basal edge, short setae on dorsal and ventral margin. Ambulatory legs long, densely setose, dactyls long, very slightly shorter than propodi. Male abdominal segment 2-5 fused, suture indistinct. Long setae on external edge of male first gonopod, distal recurved portion large and globular with rounded distal process.

Color: Light to dark brown.

Size: Maximum recorded carapace width 9 mm.

Habitat: Muddy substrate in high mangrove environment.

Distribution: South coast of Papua.

Infraorder Thalassinidea

A shrimp-like form characterizes this burrowing crustacean, having the cephalothorax compressed and the abdomen long, symmetrical, with the appendages of the sixth segment usually fitted for swimming. The covering of the body, instead of being hard, is usually soft and more or less membranous in character. An antennal scale is generally absent; the first pair of pereopods have pincer claws of unequal Size: They are marine inhabitant, live in mangrove forest, mud flat or rock and hard bottom. Infraorder Thalassinidea currently contains 11 families, and two families, Thalassinidae and Upogebiidae are present in Mimika region.

Family Thalassinidae - Mud lobster

The family Thalassinidae is characterized by long abdomen usually held curved under the thorax. The chelipeds are large and unequal. Male gonopores lie at base of the fifth walking legs and female pores on the third walking legs.

This family contains only one genus with few species, occurs in mangrove areas in the Indo West Pacific. They make burrows as deep as 2 meters and form a large mound of mud excavated from the burrow that can attain half or one meter height in mangrove forest. Mud lobster feeds on organic matter in mud. In the Mimika region there are three species, *Thalassina anomala* and *Thalassina sp*. which are rare and *T. squamifera* which is easily found in mangrove forest.

Thalassina mound in the mangrove forest

Thalassina anomala (Herbst, 1804)

Diagnosis: Rostrum triangular, slightly concave, lateral margins each has 7-8 obtuse tubercles. Hepatic region covered with small, more or less acute tubercles near its anterior margin. Posterior margin of cervical groove with 8-9 small spines. Palm of larger chela with row of 13 obtuse teeth on dorsal margin, ventral margin with 24 smaller teeth not continuing to fixed finger. Dorsal external carina reaching distal end of dorsal margin of palm, lateral surface with longitudinal lateral carina composed of depressed small tubercles.

Color: Dorsal surface of shield and abdomen reddish orange; chelipeds and walking legs white. In alcohol the color fades rapidly and becomes light yellow.

Size: Maximum recorded shield length 24 mm.

Habitat: Burrow in mud substrate in mangrove forest. Its presence easily detected by the mud mound above its burrow.

Distribution: Indo West Pacific, from Indian Ocean to Singapore, Malaysia, Indonesia, northern Australia to Fiji and Samoa Islands

Thalassina squamifera De Man, 1928

Diagnosis: Rostrum small and triangular, lateral margin each with 4-5 obtuse tubercles. Branchiostegite with 14 sharp spines. Dorsal carapace between linea thalassinica and banchial regions smooth. Hepatic and branchial regions granulated. Chelipeds unequal, dactyl longer than fixed finger. Palm of larger cheliped armed with 10 sharp compressed teeth curved forward on dorsal margin, ventral margin with 28 obtuse tubercles not extending to fixed finger. Dorsal external carina of palm reach only half of dorsal margin; lateral carina along mid lateral of palm. Lateral surface of palm smooth, mesial surface granular especially near ventral margin.

Color: Dorsal surface of carapace and abdomen brownish-orange, ventral part greyish white.

Size: Maximum recorded shield length 28 mm.

Habitat: Burrows in mangrove forest, making mound above it.

Distribution: Northern Australia and Indonesia

Thalassina sp.

Diagnosis: Rostrum small and triangular, lateral margin each with 5-7 obtuse tubercles. Branchiostegite with 12 sharp spines. Dorsal carapace between linea thalassinica and banchial regions spinuloses. Chelipeds unequal, dactyl longer than fixed finger. Palm of larger cheliped armed with 19 sharp compressed teeth curved forward on dorsal margin, large proximally becoming smaller and obscured by tuft of long setae distally, ventrolateral and ventromesial margins each with ridge of 26 obtuse tubercles not extending to tip of fixed finger; ventral surface smooth; mesial surface slightly granular. Dorsal external carina of palm extended almost distal end of palm; lateral carina absent in larger cheliped, barely discernible in small cheliped.

Color: Dorsal surface of carapace and abdomen pinkish purple, ventral part greyish white.

Size: Maximum recorded shield length 14 mm

Habitat: Burrows in mangrove forest, making mound above it.

Distribution: Papua, Indonesia

Family Upogebiidae - Ghost shrimp

Diagnostic characters include elongated, soft and curved body; broad, well developed rostrum which is triangular, quadrangular or rounded and usually with distinct spines or granules along its edges, dorsally setose. Eyestalks are cylindrical. The first pereiopod or chelipeds are of the same size, with or without claw; the second pereiopod is simple, the third and fourth pereiopods without spiniform setae on lower margin. Seventh thoracic sternite is narrow.

This family is closely related to mud lobster and it is a marine family. It has worldwide distribution in tropical and temperate waters, from intertidal to several meters depth; burrow in soft substrate such as mud or sand or found in hard substrate such as rock and coral. Family Upogebiidae currently contains more than 50 species in 8 genera. In the Mimika region, two species of the genus *Upogebia* were found in mud substrate in mangrove area.

Upogebia sp. at Ajkwa Estuary

Upogebia sp.

Diagnosis: Rostrum sub-oval, projecting beyond eyes, with 3-4 small rounded teeth on each lateral margin. Dense setae covered rostrum and each side of lateral groove, medio dorsal of carapace with low longitudinal elevation, smooth and bare. Lateral groove moderately deep and broad with rounded tubercles along its side. Gastric ridge with 3-4 rounded tubercles obscured by dense setae. Anterolateral border of carapace with strong spine. First pereopod subcheliform, ischium with 2 ventral spines, merus with 1-2 dorsal spines, carpus with 1 ventral spine and 2 dorsal spines, palm with 1 spine each on distal and proximal of dorsal margin, dactyl with 2 large obtuse teeth on cutting edge. Long setae on dorsal and ventral margin of palm, lateral and mesial surface with longitudinal row of long and dense setae medially. Photo: preserved specimen.

Color: Green uniform or whitish cream.

Size: Shield length 6.5 mm.

Habitat: This species lives in burrow in the mangrove near river mouth.

Distribution: Southwest coast of Papua, Indonesia.

Upogebia giralia Poore and Griffin, 1979

Diagnosis: Rostrum broadly rounded anteriorly, slightly longer than broad at base, projecting beyond eyes with 4-5 small teeth on each lateral side, dorsal surface with few tubercles. Dense setae covered rostrum and each side of lateral groove. Gastric region with small tubercles. Anterolateral border of carapace unarmed. First pereopod subcheliform, ischium with 1-2 ventral spines, merus with 1 dorsal subdistal spine and 3-5 ventral spines, carpus with 3 strong dorsal spines, 1 ventral spine. Propodus nearly twice as long as broad, mesial surface with 4-7 dorsal spines and large ventral spine behind fixed finger. Dactyl with median tuberculate carina on mesial surface, cutting edge dentate in median part. Second pereopod with dorsal subdistal spine on merus. Photo: preserved specimen.

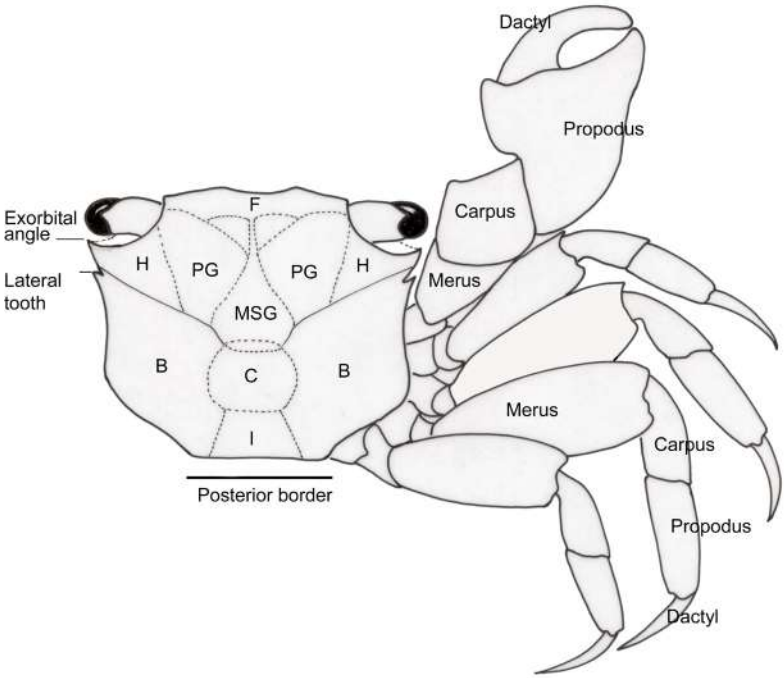
Color: Uniform green.

Size: Shield length 8.5 mm.

Habitat: Muddy substrate in mangrove forest.

Distribution: Western Australia and Queensland, Australia.

Illustrated Glossary



General shape (dorsal view, right pereopod) of brachyuran crab (family Sesarmidae).

B. Branchial region; **C.** cardiac region; **F.** Front; **H.** Hepatic region; **I.** Intestinal region; **MSG.** Mesogastric region; **PG.**Protogastric region.

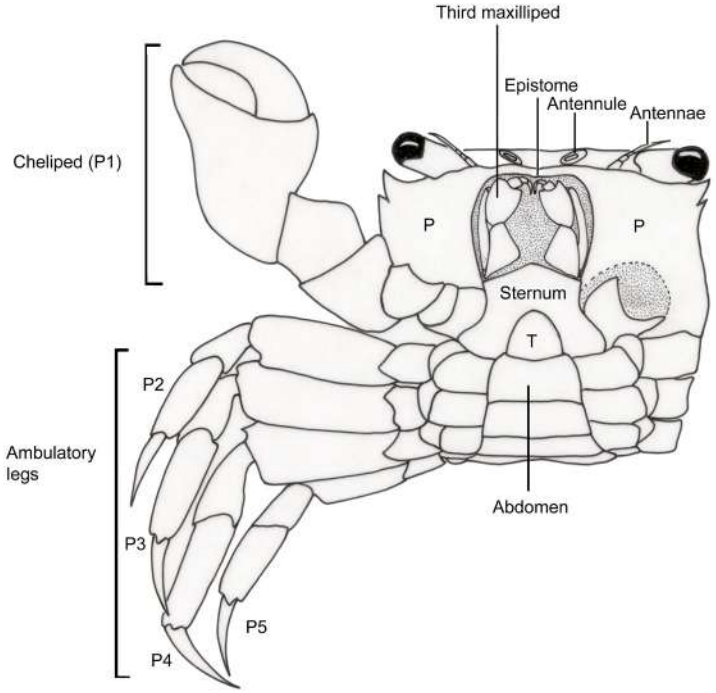
Abdomen. Posterior part of body between thorax and telson, often consisting series of similar segments.

Ambulatory leg. Thoracic appendage used in locomotion; syn. *Pereopod, pereiopod, walking leg*.

Antenna. One of pair of appendages of second cephalic somite (syn. 2nd antenna).

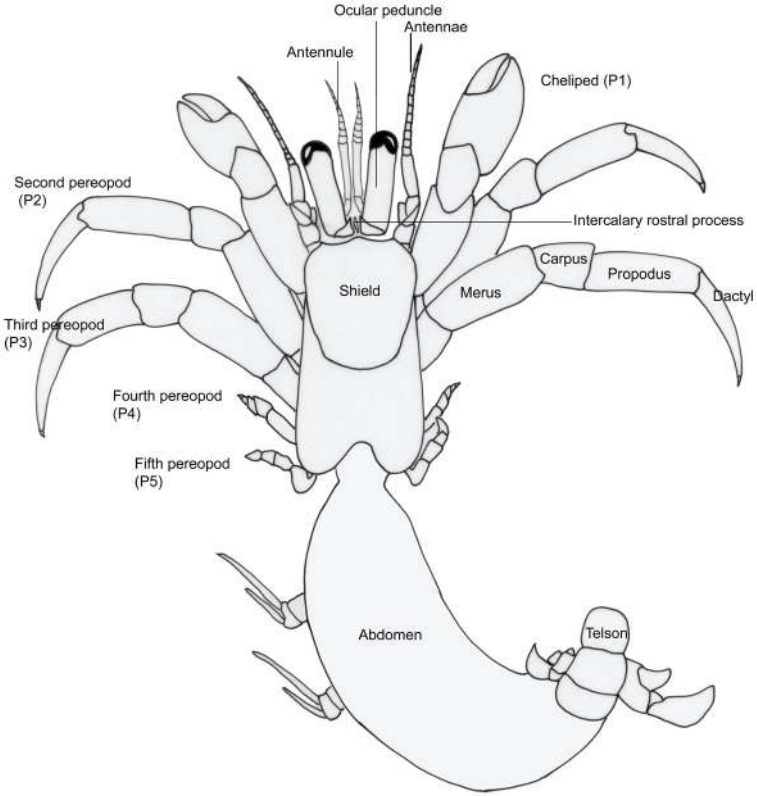
Antennal acicle. Rounded or spiniform process on outer part of proximal segment of antennular peduncles; syn. Antennal scale, stylocerite.

Antennule. One of pair of appendages of first cephalic somite (syn. 1st antenna).



General shape (ventral view, right pereopod) of brachyuran crab (family sesarmidae) **P.** Pterygestomial region; **P1**. first pereopod (Cheliped); **P2.** Second pereopod; **P3.** Third pereopod; **P4**. Fourth pereopod; **P5.** Fifth pereopod; **T.** Telson.

Anterior. Towards the front end.
Appendage. Any structure growing out of the body.
Article. Subdivision of antennal or antennular flagella or appendages.
Branchial region. Lateral part posterior to pterogostomial region.
Buccal cavity. Area of cephalon containing mouthparts; bounded by epistome anteri orly and free margin of carapace laterally.
Carapace. Cuticular, usually calcified structure covering cephalothorax.
Carapace region. Division marks on the carapace (branchial, gastric, hepatic regions …etc).
Cardiac region. Median part posterior to cervical groove between urogastric and in testinal regions.
Carpus (pl. carpi). Third segment of pereopod, articulating proximally with merus, distally with propodus.



General shape (dorsal view) of hermit crab (family Diogenidae)

Cephalon. Anteriormost tagma, bearing eyes, mouth, two pairs of antennae and three pairs of mouthpart; syn. *head*.

Cephalothorax. Anterior part of body composed of fused cephalic and thoracic somites.

Cervical groove. Transverse groove medially between gastric and cardiac region, curving toward antennal spine.

Chela. Pinching claw or pincer-like at distal end of appendage, composed of movable finger (dactyl) and fixed finger (pollex).

Cheliped. An appendage bearing chela.

Compound eyes. Paired array of contiguous ommatidia having common optic nerve trunks.
Cornea. Transparent cuticle covering ommatidia of compound eye.
Dactyl(us). Terminal segment of walking leg or cheliped. It is also the term used for the movable finger on cheliped.
Deflected front. Broadly downturned front margin of carapace.
Detritivore. Animal that lives on a diet of detritus.
Detritus. Decomposing organic litter.
Distal. Away from the body.
Dorsal. The back or upper side.
Endopod. Inner branch of biramous appendage.
Epistome. Plate of varying shape between labrum and bases of antennae.
Estuarine. Brackish tidal portion of river or coastal stream.
Exognath. Exopod of maxilliped.
Exopod. Outer branch of biramous appendage.
Exorbital angle. Angle on posterior end of orbit and distal part of anterolateral margin.
Flagellum/flagella. Vibratory treadlike extension of cell. In crustaceans, the terminal joints of the antennae.
Frontal/front. Anteromedian part including rostrum and region behind it.
Gastric region. Median part anterior to cervical groove and posterior to frontal region; sometimes epigastric, mesogastric, metagastric, protogastric and urogastric areas distinguished.
Gonopod. Pleopod modified for reproductive process (very often abbreviated as G).
Gonopore. Outlet for genital product; syn. *sexual pore*.
Habitat. Natural home of organism.
Hepatic region. Part adjoinnning antennal, cardiac and pterygostomial regions.
Intercalary rostral process. Spine between ocular acicles in hermit crab.
Intertidal. Area on the shore between the point of high tide and the point of low tide.
Intestinal region. Short transverse part posterior to cardiac region; sometimes referred to as posterior cardiac lobe.
Ischium. Fifth segment of pereopod or fist segment of endopod articulating with basis (pl. *ischia*).
Labrum. Unpaired outgrowth arising just in front of mouth and often more or less covering it.
Lateral. To the right and left of a median line.
Mandible. One of third pair of cephalic appendages, used to masticate food.

Mangrove. Many different species of trees and shrubs that grow in intertidal zone, have the ability to tolerate varying amount of saltwater and support themselves in soft muddy soils.

Manus. Broad proximal part of propodal cheliped (syn. *palm*).

Maxilla(e). Paired appendage of 5th cephalic somites, used in feeding, often also in repiration.

Maxillipeds. Paired appendage modified for feeding on 1st up to 3rd, thoracic somites, usually fused to cephalon.

Maxillule. One pair of 4th cephalic appendages, usually serving as mouthpart.

Merus (pl. meri). Fourth segment of pereopod or second segment of endopod articulating proximally with ischium and distally with carpus.

Moult. Process of shedding exoskeleton.

Omnivore. An animal that lives on a mixed diet of plant and animal material.

Ocular peduncle. Peduncle movable articulated with cephalon, with compound eye at distal end (syn. *eyestalk*).

Orbits. Circular or longitudinal sockets in which eyes situated.

Palm. See manus.

Pereopod. Thoracic appendage used in locomotion; syn. *pereiopod, ambulatory leg, walking leg*.

Pleopods. Paired appendages of any of first 5 abdominal somites, adapted for swimming.

Pollex. Fixed finger on cheliped.

Posterior. Towards the rear end.

Propodus (pl propodi). Penultimate segment of pereopod.

Proximal. Nearest to the body.

Pterygostomial. Anterolateral part on ventral surface located on opposite sides of buccal cavity.

Rostrum. Anteriorly projecting, unpaired, median extension of carapace between eyes or ocular peduncles.

Segment. Individual component of crustacean appendage connected by movable articulation with adjoining segments.

Seta (pl. setae). Hairlike process of cuticule with which it articulate or through which it produced.

Shield. Anterior part of cephalothorax in hermit crab.

Species. Group of organisms that interbreed to produce fertile offspring.

Sulcus. Grooves or furrow.

Telson. Terminal part of body, jointed to last abdominal segment, usually bearing anus.

Thoracic appendage. Any appendage attached to somite of thorax.
Thorax. Tagma between cephalon and abdomen.
Tooth. Hard, broad based, immovable projection of exoskeleton, usually sharp.
Tubercle. Small. Blunt, knob-like projections on shell or cuticle, vary greatly in size and shape.
Tuberculate. Covered with tubercles.
Tympanum (pl. tympana). Smooth area on outer surface of meri of pereopods.
Uropod. Appendage attached to 6th abdominal segment.
Ventral. Underside or lower surface.
Walking leg. See pereopod.

Further Reading and References

Allen, G. R., K. G. Hortle and S.J. Renyaan, 2000. *Freshwater Fishes of the Mimika Region New Guinea*. PT Freeport Indonesia.1-175.

Ball, E. E. & J. Haig, 1972. Hermit crab from eastern New Guinea. *Pacific Science*, **26** (1): 87-107.

Barnes, R. S. K., 1977. Concluding contribution towards a revision of, and a key to, the genus *Macrophthalmus* (Crustacea: Brachyura). *Journal of Zoology, London*, 182: 267-280.

Campbell, B. M., 1967. The Australian sesarminae (Crustacea: Brachyura). Five species of *Sesarma (Chiromantes)*. *Memoirs of the Queensland Museum*, **15** (1):

Davie, P. J. F., 1989. Re-appraisal of *Heteropanope* Stimpson and *Pilumnopeus* A. Milne Edwards (Crustacea: Decapoda: Pilumnidae) with description of new species and new genera. *Memoirs of the Queensland Museum*, **27** (2): 129-156.

Davie, P.J.F., 1992. Revision of *Sarmatium* Dana (Crustacea: Brachyura: Sesarminae) with description of three new species. *Memoirs of the Queensland Museum* **32** (1): 79-97.

Davie, P. J. F., 1994. Revision of *Neosarmatium* Serène and soh (Crustacea: Brachyura: Sesarminae) with descriptions of two new species. *Memoirs of the Queensland Museum* **35** (1): 35-74.

Davie, P. J. F., 2002. Crustacea: Malacostraca. Eucarida (Part 2). Decapoda - Anomura, Brachyura: Zoological Cataloque of Australia. 19.3B. CSIRO Publications, 1-641.

Ellison, J.C. 1997. Mangrove Tidal Swamp of the Ajkwa Estuary and Assessment of Impact of Tailings Deposition, PT. Freeport Indonesia Company, Tembagapura, Indonesia. PT. Freeport Indonesia Co., Kuala Kencana Irian Jaya

Holthuis, L. B., 1956. Contribution to New Guinea carcinology. I. *Nova Guinea*, new series, **7** (2): 123-137.

Holthuis, L. B., 1958. Contribution to New Guinea carcinology. II. *Nova Guinea*, new series, **9** (2): 231-134.

Holthuis, L. B., 1982. Freshwater Crustacea Decapoda of New Guinea. *Monographiae Biologicae*, **42**: 603-619.

Jones D. and G. J. Morgan, 1994. *A Field Guide to Crustaceans of Australian waters*. 1-216.

Morgan, G. J., 1988. A checklist of Decapod Crustacea from the Madang Region, Papua New Guinea. *Science in New Guinea* **14**(3): 124-139.

Ng, P, K. L., 1998. Crab. *The living Marine Resources of the Western Central Pacific.* Vol. 2. Cephalopods, Crustaceans, Holothurians and Sharks. Eds. Kent E. Carpenter & Volkel H. Niem.

Ng, P. K. L.& C. T. N. Chuang, 1996. The Hymenosomatidae (Crustacea: Decapoda: Brachyura) on Southeast Asia, with notes on other species. *The Raffles Bulletin of Zoology*, Supplement 3: 1-82

Ng, P. K. L. & D. L. Rahayu, 2002. A new species of leaf porter crab of the genus *Neodorippe* Serène & Romimohtarto, 1969 (Crustacea, Decapoda, Brachyura, Dorippidae) from Irian Jaya, Indonesia. *Proceedings of the Biological Society of Washington,* **115** (4): 754-759.

Ng, P. K. L. and N. Sivasothi, 1999. *A guide to the Mangrove of Singapore* II (Animal Diversity). Singapore Science Centre. 1-168.

Ng, P. K. L., D. Guinot and P. J. F. Davie, 2007. Systema Brachyrorum: Part I. An annotated Checklist of Extant Brachyuran Crabs of the world. *The Raffles Bulletin of Zoology*, Supplement 17: 1-286.

Nobili, G., 1905. Decapodi e Isopodi della Nuovo Guinea Tedesca raccolti dal sign L. Biró. *Annals Museum Natural. Hungarici* 3: 480-507.

Rahayu, D. L., 2003. Hermit crab species of the genus *Clibanarius* (Decapoda, Anomura, Diogenidae) from mangrove habitats in Papua, Indonesia, with description of a new species. *Memoirs of the Museum Victoria*, **60** (1): 99-104.

Rahayu, D. L & P. J. F. Davie, 2002. New species and new record of *Perisesarma* (Decapoda, Brachyura, Sesarminae) from Irian Jaya, Indonesia. *Crustaceana* **75** (3-4): 597-607.

Rahayu, D. L & P.J.F. Davie, 2006. Two new species of the genus *Neosarmatium* Serène & Soh, 1970 (Decapoda, Brachyura, Sesarmidae) from Papua, Indonesia. *Zoosystema*, **28**(2): 573-584.

Rahayu, D. L. & K. Hortle, 2002. The genus *Diogenes* (Decapoda, Anomura, Diogenidae) from Irian Jaya, Indonesia with description of a new species. *Crustaceana* **75** (3-4): 609-619.

Rahayu, D. L. & P.K.L. Ng, 2003. The Camptandriidae of Irian Jaya, Indonesia, including the descriptions of two new species (Decapoda: Brachyura). *Journal of Crustacean Biology* **23** (4): 951-962.

Rahayu, D. L. & P.K.L. Ng, 2003. On two species of mangrove Leucosiidae from Irian Jaya, Indonesia, with notes on *Philyra malefactrix* (Kemp, 1915) (Decapoda: Brachyura). *Crustacean Research*, 32: 1-12

Rahayu, D.L. & P.K.L. Ng, 2004. The Hymenosomatidae (Crustacea: Decapoda; Brachyura) of Timika, Irian Jaya, Indonesia. *Zoosystema*, **26**(1): 87-94.

Rahayu, D.L. & P. K. L. Ng, 2005. On two new species of the genera *Haberma* and *Parasesarma* (Crustacea: Decapoda: Brachyura: Sesarmidae) from Papua, Indonesia. *Zoologische Meddedelingen, Leiden*,**79-2** (8): 167-178.

Rahayu, D.L., & M. Takeda, 2000. A new species of the genus *Clistocoeloma* (Crustacea: Decapoda: Grapsidae) from Irian Jaya, Indonesia. *Bulletin of the National Science Museum,* Series A (Zoology), **26** (2): 35-41.

Rathbun, M., 1926. Brachyuran crabs from Australia and New Guinea. *Record of the Australian Museum* **15** (2): 177-182.

Roux , J., 1917. Resultats de l'expédition scientifique Néerlandaise à la Nouvelle Guinée. Crustacés. Nova Guinea, Paris, 5: 589-621.

Roux, J., 1927. Contribution à la faune carcinologique d'eau douce de la Nouvelle-Guinée. *Nova Guinea* **15** (3) : 319-150.

Serène, R & C.L. Soh, 1970. New Indo-Pacific Genera allied to *Sesarma* Say 1817 (Brachyura, Decapoda, Crustacea). *Treubia*, **27** (4): 387-407, pl. 1-8.

Setyadi, G. R. Pribadi, D.L. Rahayu, W. W. Kastoro, 2002. Mangrove Invertebrate and Vegetation Monitoring 2001. Internal Report. Environmental Department. P.T. Freeport Indonesia, Papua, Indonesia.

Stephenson W. & B. Campbell, 1959. The Australian Portunids (Crustacea: Portunidae). III. The Genus *Portunus. Australian Journal of Marine and Freshwater Research* **10** (1): 84-124. (2)

Stephenson W. J.H. Hudson & B. Campbell, 1957. The Australian Portunids (Crustacea: Portunidae). II. The Genus *Charybdis. Australin Journal of Marine and Freshwater Research* **8** (4): 491-507.

Takeda, M., 1978. Soldier crabs from Australia and Japan. *Bulletin of the National Science Museum*, Series A (Zoology), **4** (1): 31-38)

Tesch, J.J., 1917. Synopsis of the genera *Sesarma, Metasesarma, Sarmatium* and *Clistocoeloma* with a key to determination of the Indo-Pacific species. *Zoologische Mededeelingen*.**3** (2-3): 127-260.

Wee, D.P.C. and P.K.L. Ng, 1995. Swimming Crabs of the genera *Charybdis* De Haan, 1833, and *Thalamita* Latreille, 1829 (Crustacea: Decapoda: Brachyura: Portunidae) from Peninsular Malaysia and Singapore. *The Raffles Bulletin of Zoology*, supplement 1: 1-128.

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