

## Chapter 11

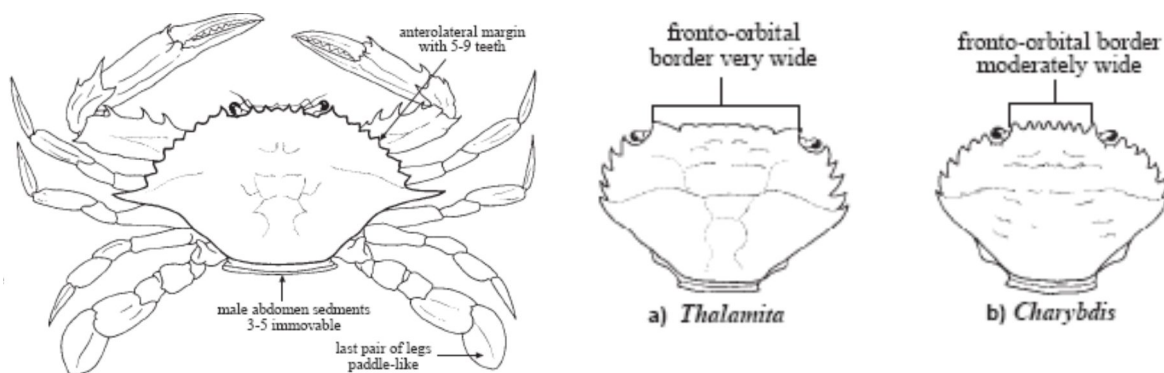
## Brachyuran Crabs

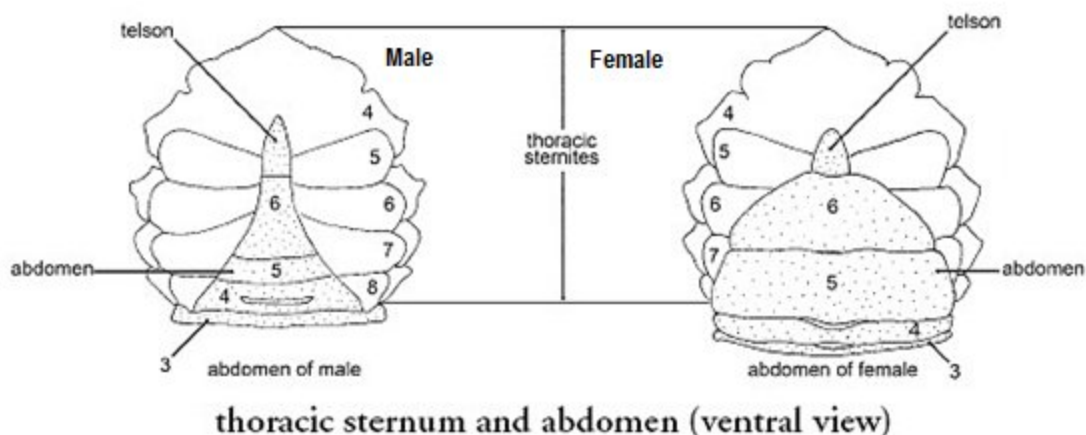
Josileen Jose

Most of the edible crabs caught from marine and brackish water environments belong to the family Portunidae. In the Indian Ocean, the crab fauna of Portunidae family is included under sub families, Podophthalmidae (Borradaile), Catoptrinae (Sakai), Portuninae (Rafinesque), Caphyrinae (Alcock), Carcininae (Macleay) and Polybiinae (Ortmann). Most of the edible crabs caught from marine and brackishwater environments belong to the sub family Portuninae. In the seas around India, five genera of Portuninae have been reported by various authors. They are *Scylla*, *Portunus*, *Charybdis*, *Lupocyclus* and *Thalamita*. Among them the first three genera contribute to the commercial crab fishery. Commercially important species are *Scylla* spp. (Mud crabs), *Portunus pelagicus* (blue swimmer crab), *P. sanguinolentus* (three spotted crab), *Charybdis feriatius* (crucifix crab), *C. lucifera* (Yellowish brown crab), *C. natator* (line crab) and *Podophthalmus vigil* (long eye-stalk crab; sub fly., Podophthalmidae).

## Portunidae

Carapace hexagonal, transversely ovate to transversely hexagonal, sometimes circular; dorsal surface relatively flat to gently convex, usually ridged or granulose; front broad, margin usually multidentate; usually 5 to 9 teeth on each anterolateral margin, posterolateral margins usually distinctly converging. Endopodite of second maxillipeds with strongly developed lobe on inner margin. Legs laterally flattened to varying degrees, last 2 segments of last pair paddle-like. Male abdominal segments 3 to 5 completely fused, immovable.





### Key to species of interest to fisheries occurring in the area

- 1a.** Carapace with 2 anterolateral teeth; eyes very long, reaching lateral edge of carapace (Fig. 1) ..... *Podophthalmus vigil*
- 1b.** Carapace with more than 2 anterolateral teeth; eyes normal in size ..... □ 2
- 2a.** Carapace rounded; ventral surface of palm with stridulatory (sound-producing) ridges (Fig. 2a) ..... *Ovalipes punctatus*
- 2b.** Carapace transversely ovate; palm without any stridulatory (sound-producing) ridges (Fig. 2b) ..... 3

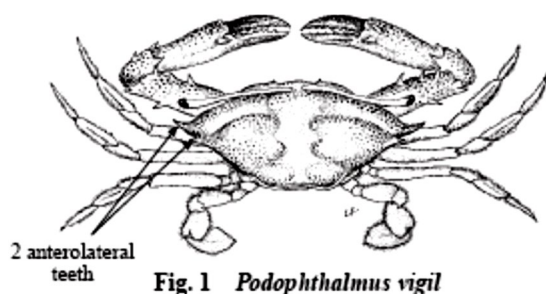
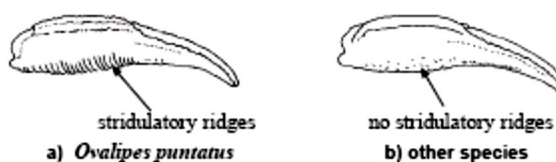
Fig. 1 *Podophthalmus vigil*

Fig. 2 chela in ventral view

- 3a. Five to 7 teeth on each anterolateral margin (Fig. 3a-c) ..... ☐ 4  
 3b. Nine teeth on each anterolateral margin (Fig. 3d) ..... ☐ 12

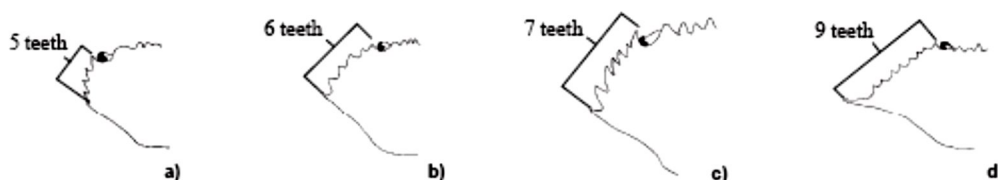


Fig. 3 lateral margin of carapace (dorsal view)

- 4a. Width of frontal-orbital border not much less than greatest width of carapace; 5 teeth on each anterolateral margin (first tooth sometimes with accessory denticle) (Fig. 4a) ..... ☐ 5  
 4b. Width of frontal-orbital border distinctly less than greatest width of carapace; 6 or 7 teeth on each anterolateral margin (Fig. 4b) ..... ☐ 6

- 5a. Basal antennal segment with a smooth or granulated ridge (Fig. 5a) ..... *Thalamita crenata*  
 5b. Basal antennal segment with several sharp spines (Fig. 5b) ..... *Thalamita spinimana*

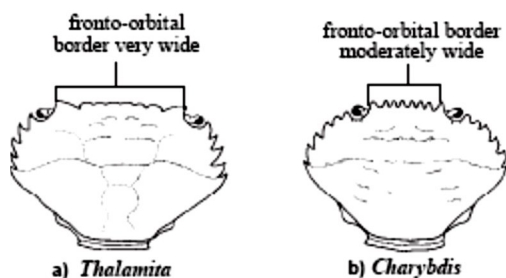


Fig. 4 carapace (dorsal view)

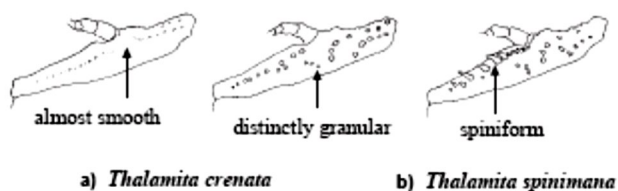


Fig. 5 basal antennal segment

- 6a. Posterior border of carapace forming an angular junction with posterolateral border (Fig. 6a); merus of cheliped without distal spine on posterior border ..... *Charybdis truncate*  
 6b. Posterior border of carapace forming a curve with posterolateral border (Fig. 6b); merus of cheliped with distal spine on posterior border ..... ☐ 7

- 7a. Carapace with distinct ridges or granular patches behind level of last pair of anterolateral teeth (Fig. 7a) ..... *Charybdis natator*  
 7b. Carapace without distinct ridges or granular patches behind level of last pair of anterolateral teeth (Fig. 7b) ..... ☐ 8

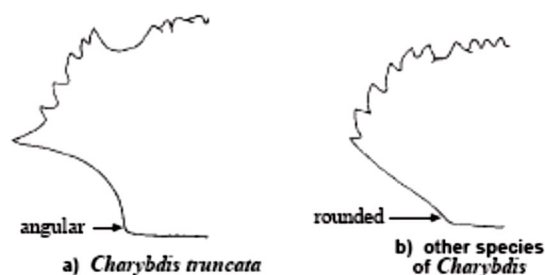


Fig. 6 left side of carapace (dorsal view)

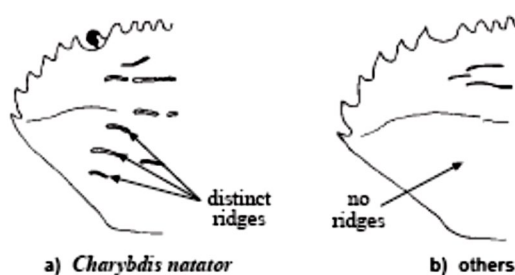


Fig. 7 left side of carapace (dorsal view)

8a. Merus of cheliped with 2 spines on anterior border; palm with 2 spines on upper surface (Fig. 8a).....*Charybdis anisodon*

8b. Merus of cheliped with 3 or 4 spines on anterior border; palm with more than 2 spines on upper surface (Fig. 8b)..... 9

9a. First anterolateral tooth not truncate or notched (Fig. 9a).....*Charybdis annulata*

9b. First anterolateral tooth truncate or notched (Fig. 9b)..... 10

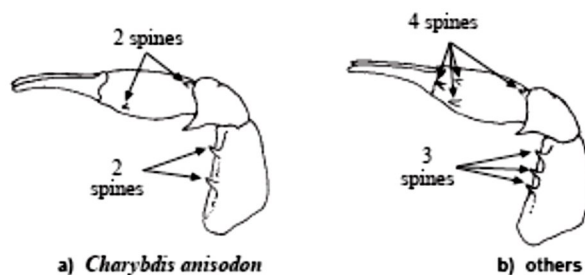


Fig. 8 right cheliped (dorsal view)

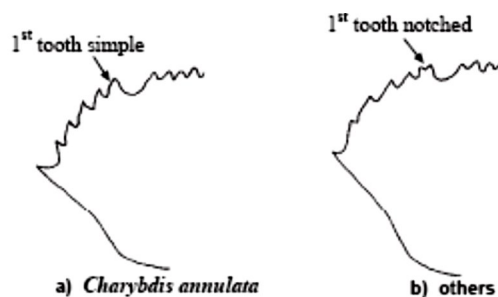


Fig. 9 lateral margin of carapace (dorsal view)

10a. Palm of cheliped with 4 spines on upper surface (Fig. 10a); male abdominal segment 4 keeled (Fig. 11a).....*Charybdis feriatus*

10b. Palm of cheliped with 5 spines on upper surface (Fig. 10b); male abdominal segment 4 not keeled (Fig. 11b)..... 11



Fig. 10 right cheliped (dorsal view)

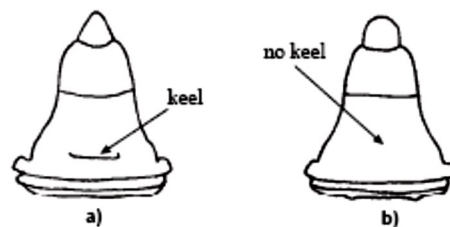


Fig. 11 male abdomen

11a. Palm with well-developed spines (Fig. 12a); male abdominal segment 6 with convex lateral borders (Fig. 13a); last anterolateral tooth smallest and spiniform, not projecting beyond preceding tooth (Fig. 14a).....*Charybdis japonica*

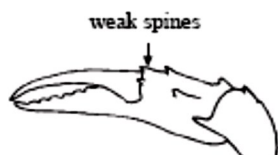
11b. Palm with poorly developed spines (Fig. 12b); male abdominal segment 6 with lateral borders parallel in proximal half (Fig. 13b); last anterolateral tooth elongate, projecting laterally beyond preceding tooth (Fig. 14b).....*Charybdis affinis*

12a. Last anterolateral tooth subequal in size to others (Fig. 15a)..... □13

12b. Last anterolateral tooth at least 2 times larger than others (Fig. 15b)..... 16



a) *Charybdis japonica*

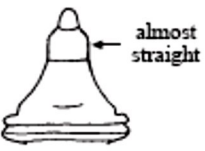


b) *Charybdis affinis*

Fig. 12 right cheliped

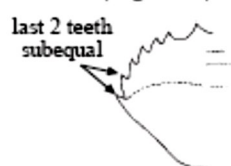


a) *Charybdis japonica*

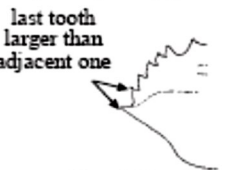


b) *Charybdis affinis*

Fig. 13 male abdomen



a) *Charybdis japonica*

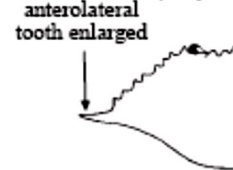


b) *Charybdis affinis*

Fig. 14 anterolateral teeth



a) *Scylla*



b) *Portunus*

Fig. 15 anterolateral teeth

13a. Carpus of cheliped with only 1 low to very low granule on outer surface, never spiniform (Fig. 16a); colour of palm usually with at least some patches of orange or yellow in life .... 14

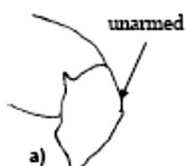
13b. Carpus of cheliped with 2 distinct spiniform or sharp granules or spines on outer surface (Fig. 16b); colour of palm in life green to purple ..... 15

14a. Frontal margin usually with sharp teeth (Fig. 17a); palm usually with distinct, sharp spines (Fig. 18a)..... *Scylla paramamosain*

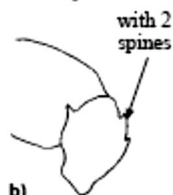
14b. Frontal margin usually with rounded teeth (Fig. 17b); palm usually with reduced, blunt spines (Fig. 18b)..... *Scylla olivacea*

15a. Frontal margin usually with rounded teeth (Fig. 19a); sharp granules on palm and carpus never spiniform; colour in life: carapace usually very dark green to black, outer surface of palm purple and never with marbled pattern, last legs marbled only in males  
... *Scylla tranquebarica*

15b. Frontal margin usually with sharp teeth (Fig. 19b); sharp granules on palm and carpus often spiniform; colour in life: carapace usually green to olive-green, outer surface of palm green and often with marbled pattern, last legs marbled both in males and females

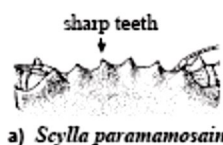


a)



b)

Fig. 16 carpus of cheliped



a) *Scylla paramamosain*

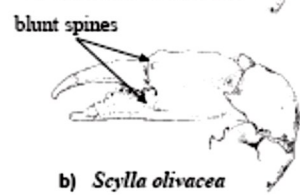


b) *Scylla olivacea*

Fig. 17 frontal margin of carapace (dorsal view)

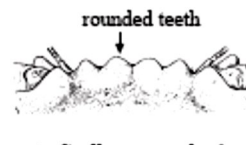


a) *Scylla paramamosain*



b) *Scylla olivacea*

Fig. 18 right cheliped



a) *Scylla tranquebarica*



b) *Scylla serrata*

Fig. 19 frontal margin of carapace (dorsal view)

.....  
.....  
.....  
.....  
.....  
*Scylla serrata*

16a. Carapace with 3 purple to red spots on posterior half. . . *Portunus sanguinolentus*

16b. Carapace marbled or with uniform coloration . . . . . □ 17

17a. Front with 4 teeth (Fig. 21a); inner margin of merus of cheliped with 3 spines (Fig. 22a)

. . . . . *Portunus pelagicus*

17b. Front with 3 teeth (Fig. 21b); inner margin of merus of cheliped with 4 spines (Fig. 22b)

. . . . . *Portunus trituberculatus*

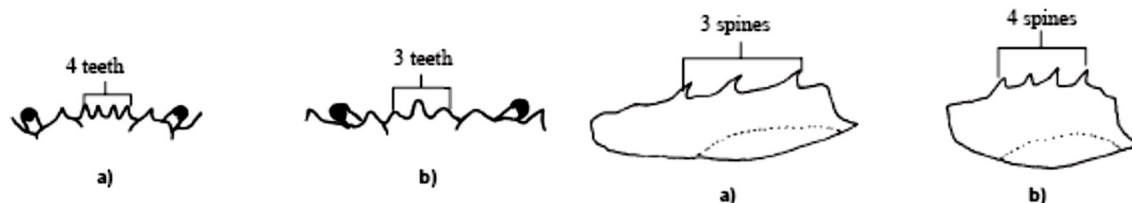


Fig. 21 frontal margin of carapace (dorsal view)

Fig. 22 merus of cheliped (inner margin)

Key – P.K.L.Ng .1998. FAO species identification guide for fishery purposes – Crabs –Portunidae .

*Portunus pelagicus* (Linnaeus, 1758) (Flower crab).

Carapace rough to granulose, front with 4 acutely triangular teeth; 9 teeth on each anterolateral margin, the last tooth 2 to 4 times larger than preceding teeth. Chelae elongate in males; larger chela with conical tooth at base of fingers.

Colour: males with blue markings, females dull green/greenish brown.

*Portunus sanguinolentus* (Herbst, 1783) ( Three-spot swimming crab).

Carapace finely granulose, regions just discernible; 9 teeth on each anterolateral margin, the last tooth 2 to 3 times larger than preceding teeth. Chelae elongated in males; larger chela with conical tooth at base of fingers; pollex ridged.

Colour: olive to dark green, with 3 prominent maroon to red spots on posterior 1/3 of carapace.

*Charybdis feriatus* (Linnaeus, 1758) (Crucifix crab)

Carapace ovate; 5 distinct teeth on each anterolateral margin.

Colour: distinctive pattern of longitudinal stripes of maroon and white, usually with distinct white cross on median part of gastric region; legs and pincers with numerous scattered white spots.

*Charybdis natator* (Herbst, 1789) (Ridged swimming crab)

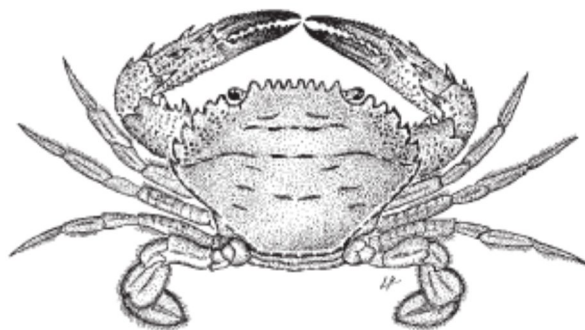
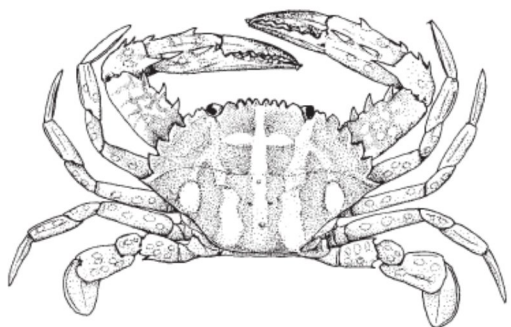
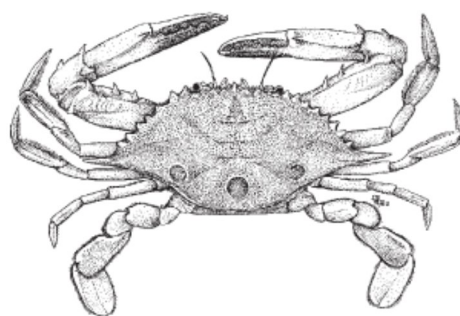
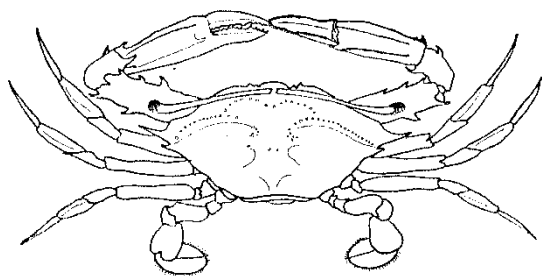
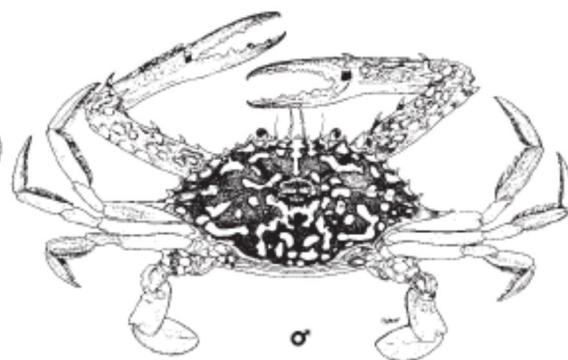
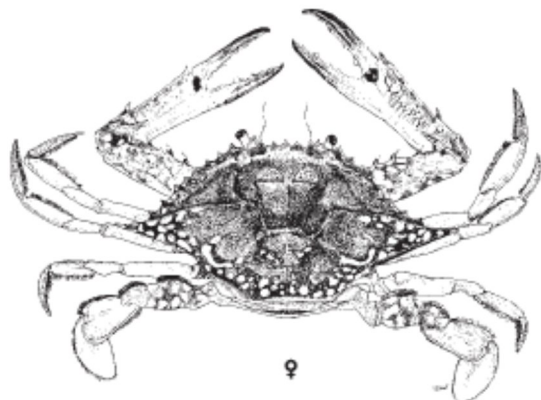
Carapace with densely covered with very short pubescence which is absent on several distinct transverse granulated ridges in anterior half.

Colour: orangish red overall, with ridges on carapace and legs dark reddish brown.

*Podophthalmus vigil* (Fabricius, 1798)

Carapace distinctly broader than long; anterior margin much broader than posterior margin, with posterolateral margins converging strongly towards narrow posterior carapace margin; orbits very broad. Eyes very long, reaching to or extending beyond edge of carapace.

Colour: carapace green; chelipeds and parts of legs violet to maroon in adults.

*Charybdis feriatus* (Linnaeus, 1758)*Charybdis natator* (Herbst, 1789)*Podophthalmus vigil* (Fabricius, 1798)*Portunus sanguinolentus* (Herbst, 1783)*Portunus pelagicus* (Linnaeus, 1758)

***Scylla* spp.**

The taxonomy of the genus *Scylla* has been terribly confused and is still difficult. Recent research in Australia (Keenan et al., 1998) has clearly shown, using morphological, DNA, and allozyme data, that there are 4 species of *Scylla*.

***Scylla serrata* (Forsskål, 1775) (Giant mud crab)**

Carapace smooth, with strong transverse ridges; H-shaped gastric groove deep; relatively broad frontal lobes, all more or less in line with each other; broad anterolateral teeth, projecting obliquely outwards, colour green to greenish black; legs may be marbled. Well- developed spines present on outer surface of chelipedal carpus and anterior and posterior dorsal parts of palm.

***Scylla tranquebarica* (Fabricius, 1798) (Purple mud crab)**

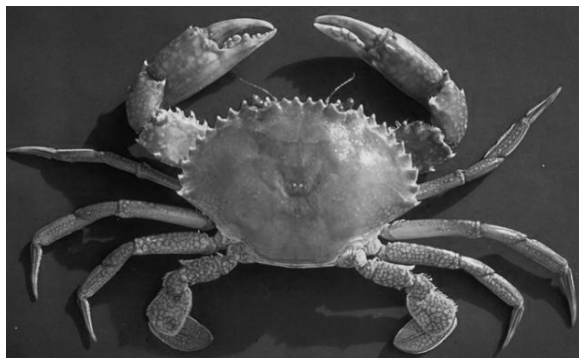
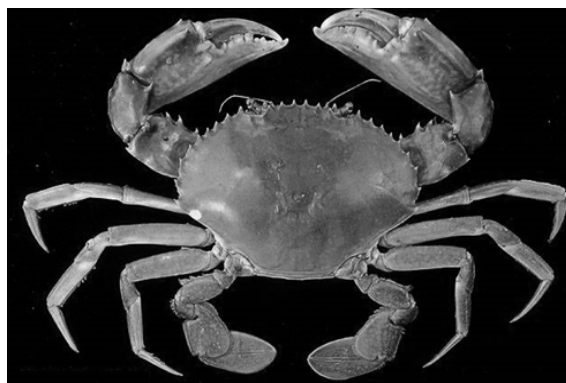
Colour varies from brown to almost black in coloration, and has very well-developed spines on the outer surfaces of the chelipedal carpus and the palm (as seen in *S. serrata*). It differs from *S. serrata*, however, by having the frontal teeth more acutely triangular, the median pair projecting slightly forwards of the lateral pair, and the anterolateral teeth gently curving anteriorly, giving the carapace a less transverse appearance.

***Scylla olivacea* (Herbst, 1796) (Orange mud crab)**

Carapace brownish to brownish green in colour (sometimes orangish), palm orange to yellow. It has a smoother, more evenly convex carapace with very low transverse ridges, a shallow H-shaped gastric groove, the median pair of the frontal lobes more rounded and projecting slightly forwards of the lateral ones, the anterolateral teeth gently curving anteriorly, giving the carapace a less transverse appearance. It also has very low spines on both the outer surface of the chelipedal carpus and the dorsal surface of palm.

***Scylla paramamosain* Estampador, 1949 ( Green mud crab)**

Carapace usually green to light green, palm green to greenish blue with lower surface and base of fingers usually pale yellow to yellowish orange. Frontal margin usually with sharp teeth, palm usually with distinct, sharp spines.

*Scylla serrata* (Forsskål, 1775)*Scylla tranquebarica* (Fabricius, 1798)*Scylla olivacea* (Herbst, 1796)*Scylla paramamosain* Estampador, 1949

## Biology

### Sexuality

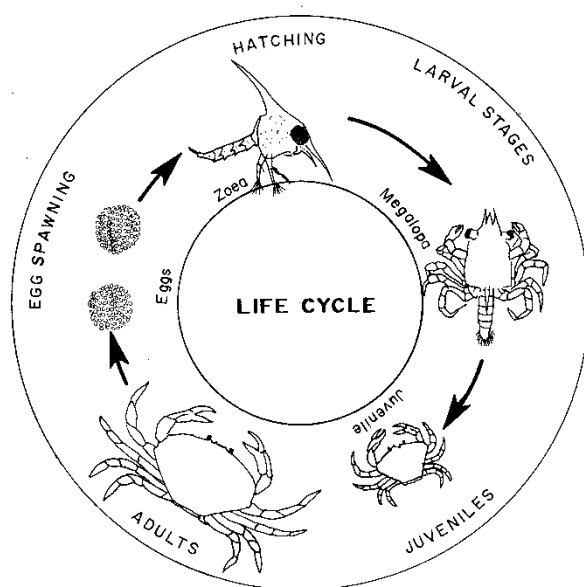
In crabs sexes are separate and sexes can be distinguished from the shape of the abdomen. In males the abdomen is narrow, inverted 'T' shaped and in addition mature males have larger and broader chelae. The first and second abdominal appendages (pleopods) are highly modified to form an intromittant copulatory organ. Females possess a broad abdomen, conical/oval in shape (according to the stage of maturity) and bear four pairs of pleopods.

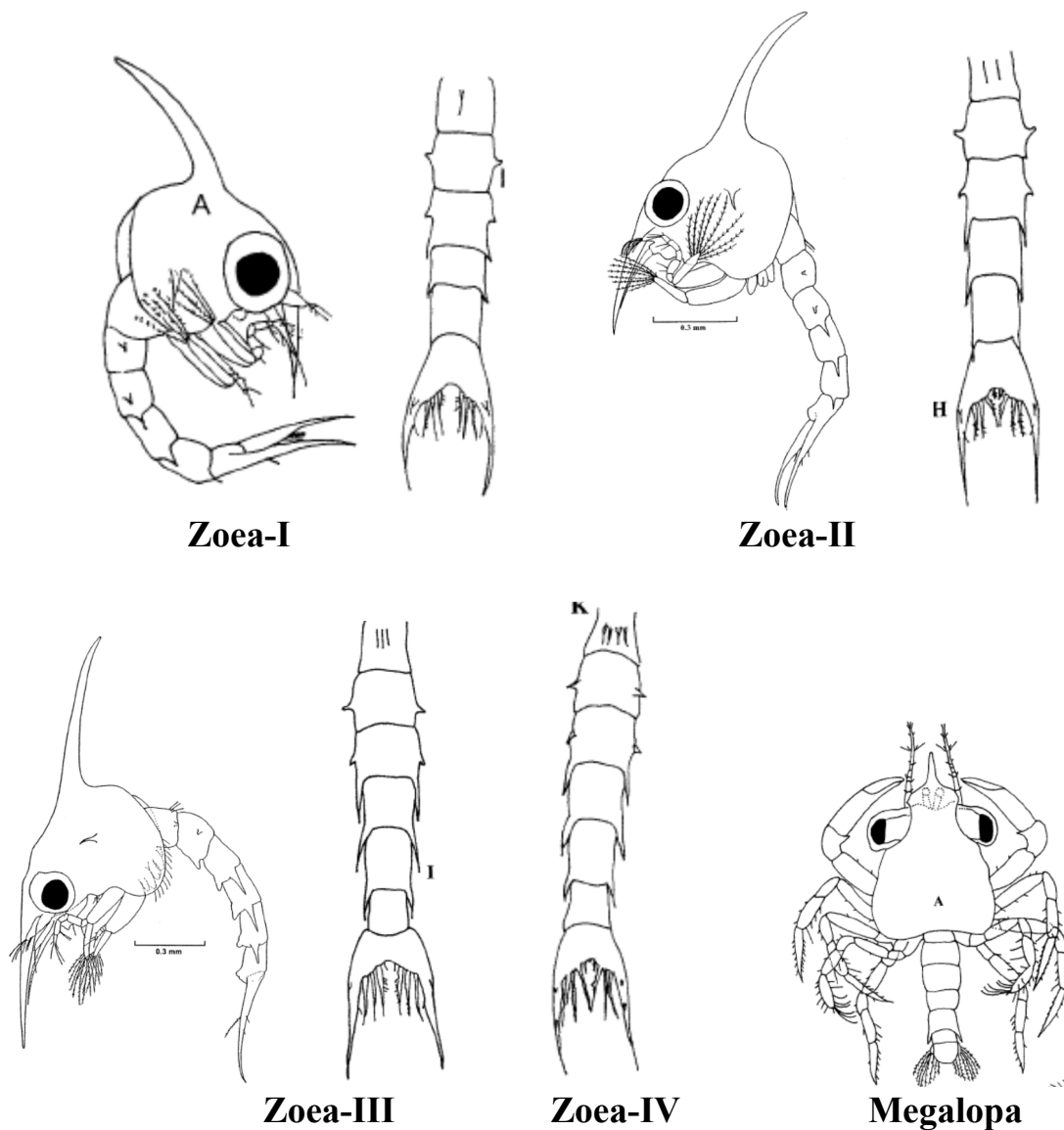
## Mating and spawning

Like in shrimps, mating takes place as soon as the female crab moults. The sperms are transferred and stored in the spermatheca. After the spawning the eggs are attached to the endopodites of the pleopods and females carry the 'berry' till hatching. The embryonic development takes 8-12 days in tropical species and the period is considerably long in other species. Hatching generally takes place during early morning hours.

## Life cycle & Larval stages

The larva passes through zoea (no. vary according to the species) and megalopa stages and moult to crab instar. For example *P. pelagicus* has four zoeae & a megalopa stage and *Scylla* spp. have five zoeae & a megalopa stage.





A- Carapace, I- Abdominal segment, H- Telson,  
K- First abdominal segment with spines

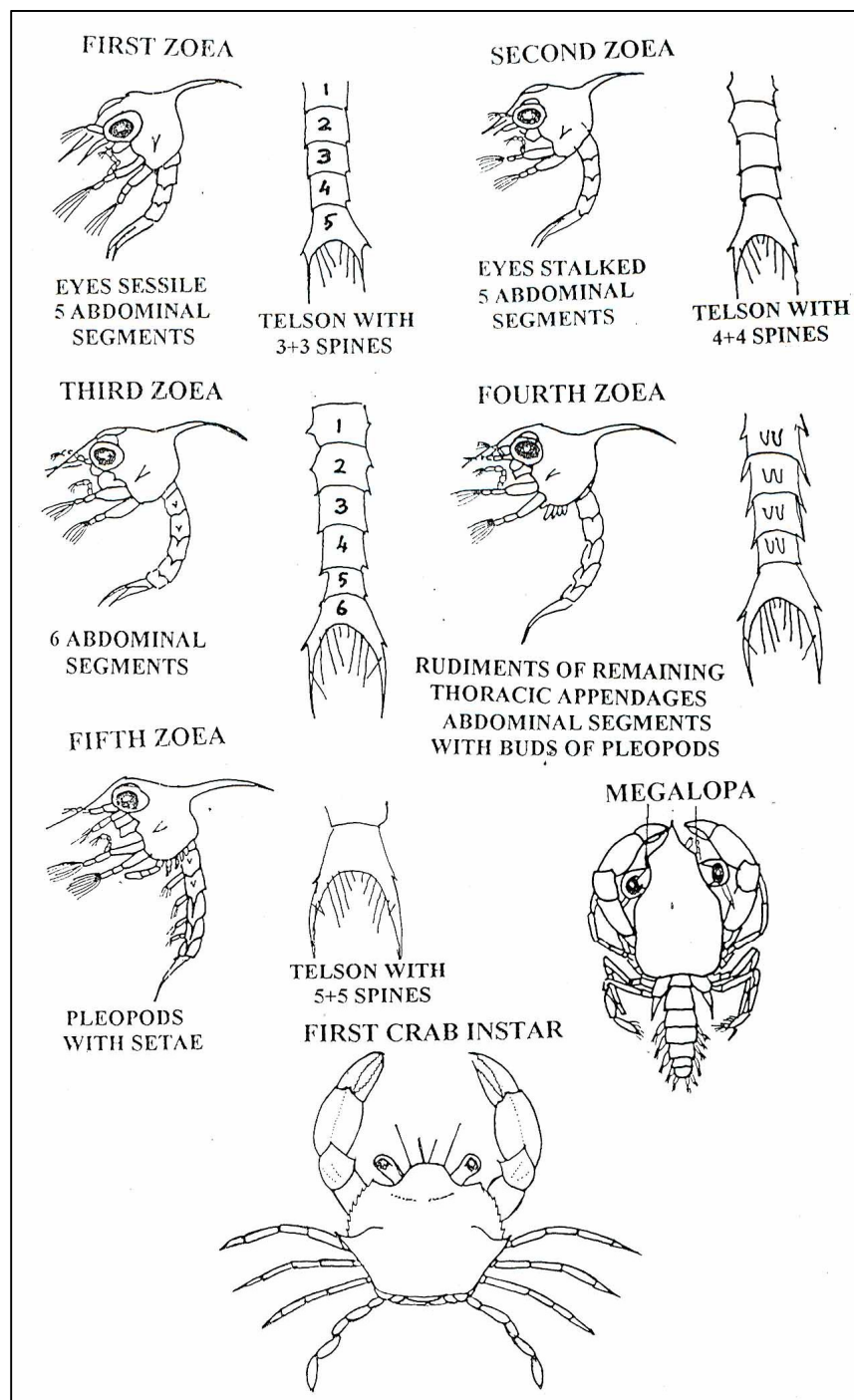
**\*Larval stages of the marine crab, *Portunus pelagicus* (Linnaeus, 1758)**

\* For details refer **Josileen, J.** and N. G. Menon. 2004. Larval stages of the blue swimmer crab, *Portunus pelagicus* (Linnaeus, 1758) (Decapoda, Brachyura). **Crustaceana** 77 (7): 785-803.

## Mud Crab, *Scylla* Spp.

### Larval development

The different *Scylla* spp. pass through 5 zoeal stages and a megalopa stage before it moults to the crab stage, taking 21-25 days for the entire cycle.



*Scylla* Larval stages (Zoea 1- 5 & megalopa)

## References and suggested readings

- Carpenter, K.E. and Niem, V.H.** (eds). 1998. FAO species identification guide for fishery purposes. The living marine resources of the Western Central Pacific. Volume 2. Cephalopods, crustaceans, holothurians and sharks. 687-1396 p.
- Josileen Jose** and N.G. Menon, 2005. Growth of the blue swimmer crab, *Portunus pelagicus* (Linnaeus, 1758) (Decapoda, Brachyura) in captivity. *Crustaceana*, 78(1): 1-18
- Josileen Jose** and N.G. Menon, 2004. Larval stages of blue swimmer crab, *Portunus pelagicus* (Linnaeus, 1758) (Decapoda, Brachyura). *Crustaceana*, 77 (7): 785-803.
- Radhakrishnan, E.V., Mary K. Manisseri and G. Nandakumar.** 2007. Status of research on crustacean resources. In: Mohan Joseph Modayil and N.G. K. Pillai (Eds.) *Status and Perspectives in Marine Fisheries Research in India*, Central Marine Fisheries Research Institute, Kochi : 135-172.
- Keenan, C.P., P.J.F. Davie, and D.L. Mann.** 1998. A revision of the genus *Scylla* De Haan (Crustacea: Decapoda: Brachyura: Portunidae). *Raffles Bull. Zool.*, 46(1): 217-241