

# CRAB FARMING



Nandini Padhi  
Asst. Prof.  
CUTM, Paralakhemundi

# Why crabs farming?

- Commercial significance as food organisms.
- The crab meat is having high export value and highly relished by foreigners.
- Resistance to diseases in culture.
- Survival outside the water in case of emergency.
- Tolerance to wide range of temperature & salinity.
- *Scylla serrata* mainly cultured for its meat rich chelate legs.
- Crab meat is sweet and tasty .
- It also have medicinal value and used to cure various protein deficiency diseases.
- Crab meat has 20% protein , 5%fat , 2% Minerals , vitamins A and D , glycogen and free amino acids so it has high demand as a table food all over the countries.

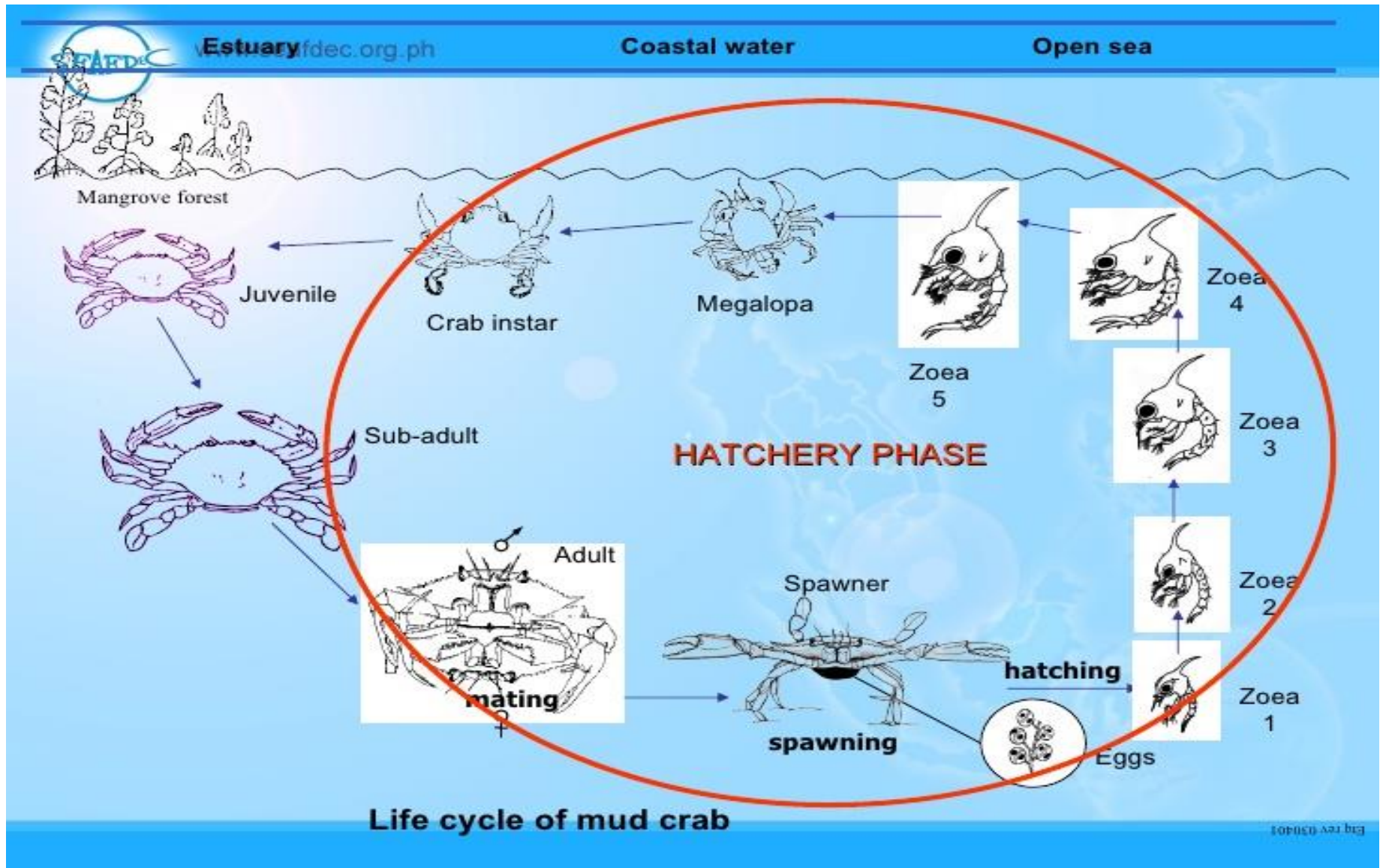
# Distribution and habitat of *Scylla* species

Species	Distribution	Habitat
<i>S. serrata</i>	Indian Ocean, Red Sea, Pacific Ocean – the most widespread <i>Scylla</i> species.	Associated with mangrove forests inundated with full salinity oceanic water for the greater part of the year. Can tolerate reduced salinity.
<i>S. paramamosain</i>	South China Sea, Java Sea – an abundant species where it occurs.	Associated with various habitats including shallow coral rubble; shallow subtidal flats and estuarine ponds; mangrove forests.
<i>S. olivacea</i>	South China Sea, Indian Ocean, Pacific Ocean – moderately widespread, often associated with <i>S. tranquebarica</i> .	Associated with mangrove forests and coastlines inundated with reduced salinity seawater during the wet season.
<i>S. tranquebarica</i>	South China Sea, Pacific Ocean, Indian Ocean – a widespread species, often associated with <i>S. olivacea</i> .	Associated with mangrove forests and coastlines inundated with reduced salinity seawater for part of year.

Source: Keenan, Davie and Mann, 1998.

- A total of 11 species of crabs belonging to 7 genera of 04 families are found in India which are of commercial importance for culture process.
- The most highly esteemed species suitable for costal aquaculture is *Scylla serrata* commonly known as mud crab.
- As the crabs bore holes along the dykes and cause leakage so coastal ponds with numerous mounds and un-submerged regions are more suitable for crab culture.
- In southern Asia, female crabs carrying eggs are few in winter, but in tropical regions, they can be found almost throughout the year.
- Reproduction season varies according to local water temperature.

# LIFE CYCLE OF MUD CRAB



# SEXUAL DIMORPHISM



male



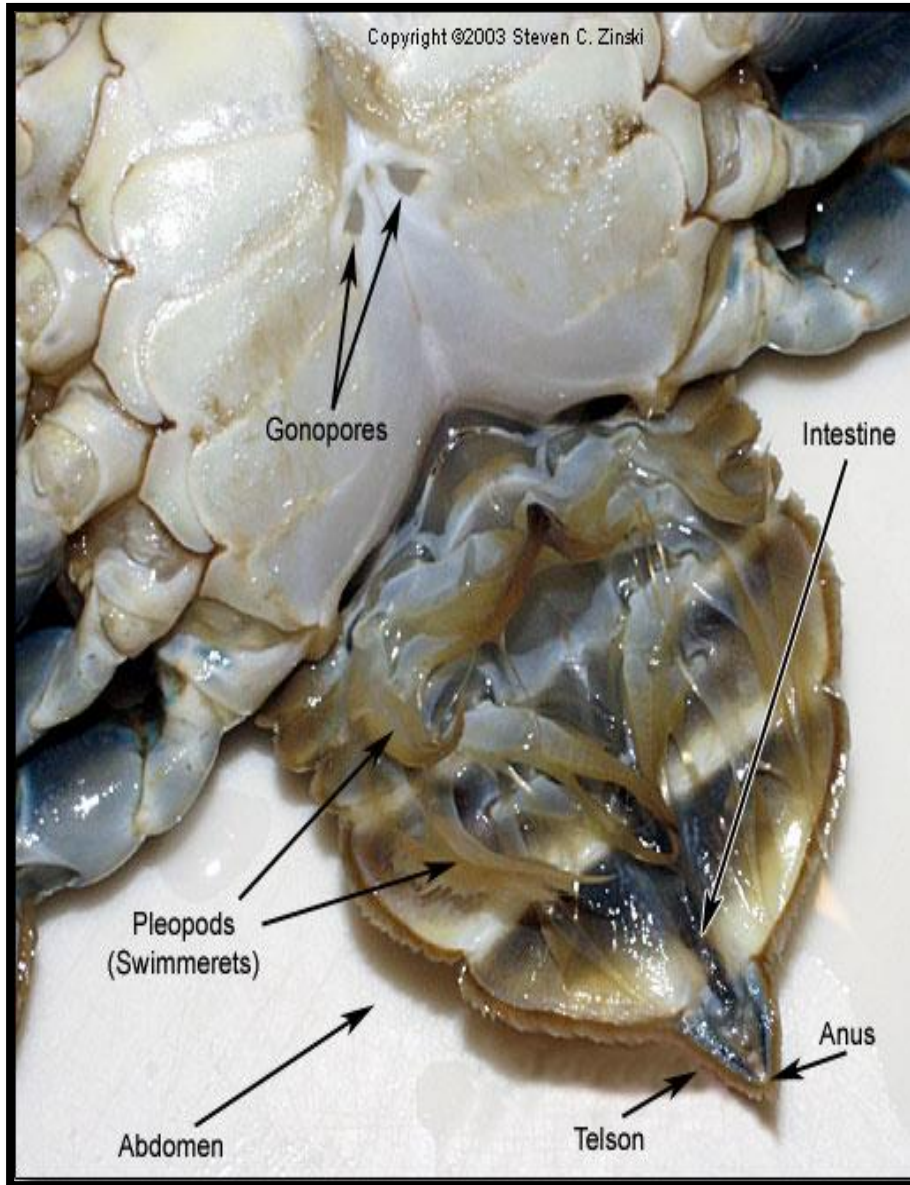
female

- ❖ Abdominal flap at the ventral side is **slender and triangular**.
- ❖ **2 pairs** of abdominal appendages.
- ❖ Gonopore- at **base of fifth** walking leg.

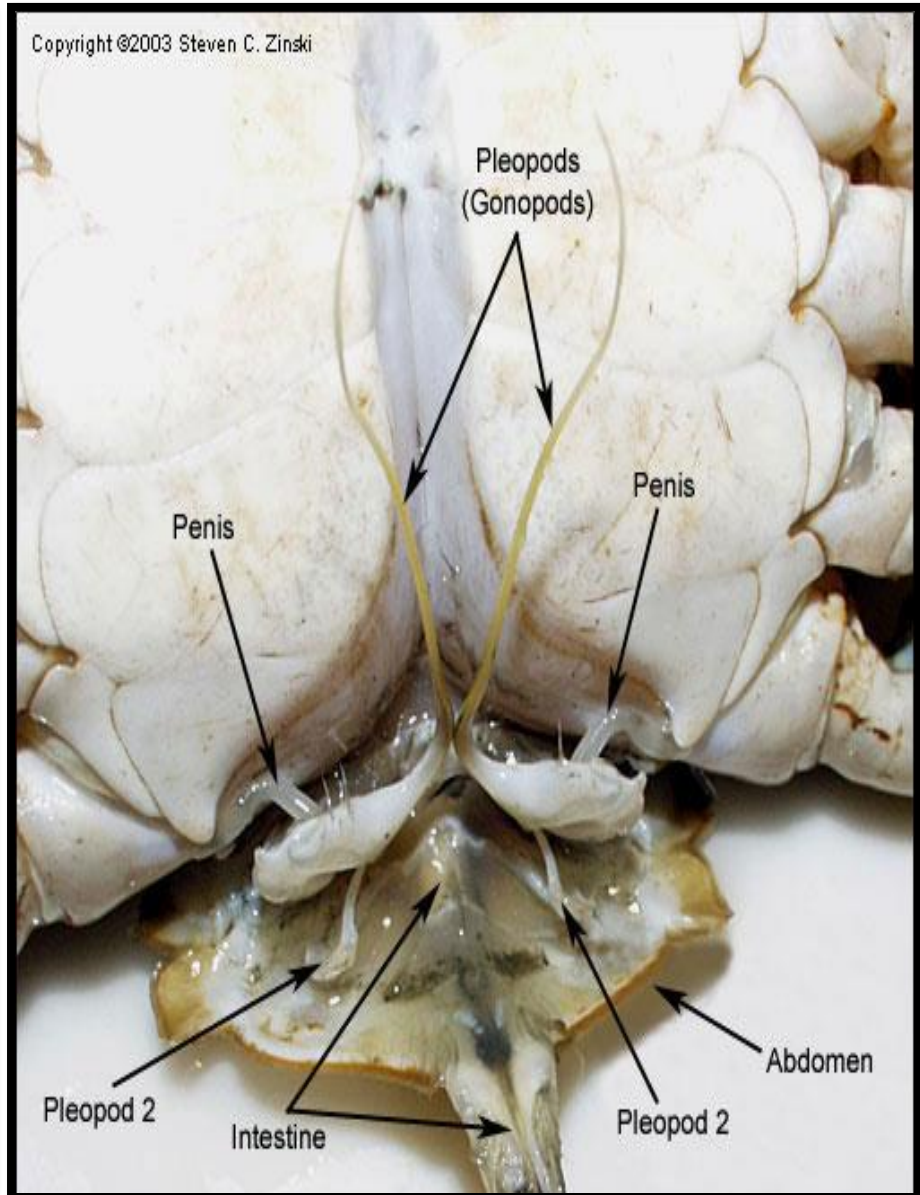
- ❖ Abdominal flap at the ventral side is **broad and semicircular**.
- ❖ **4 pairs** of abdominal appendages.
- ❖ Gonopore- at the **sterna of the sixth** thoracic segment.



# FEMALE



# MALE



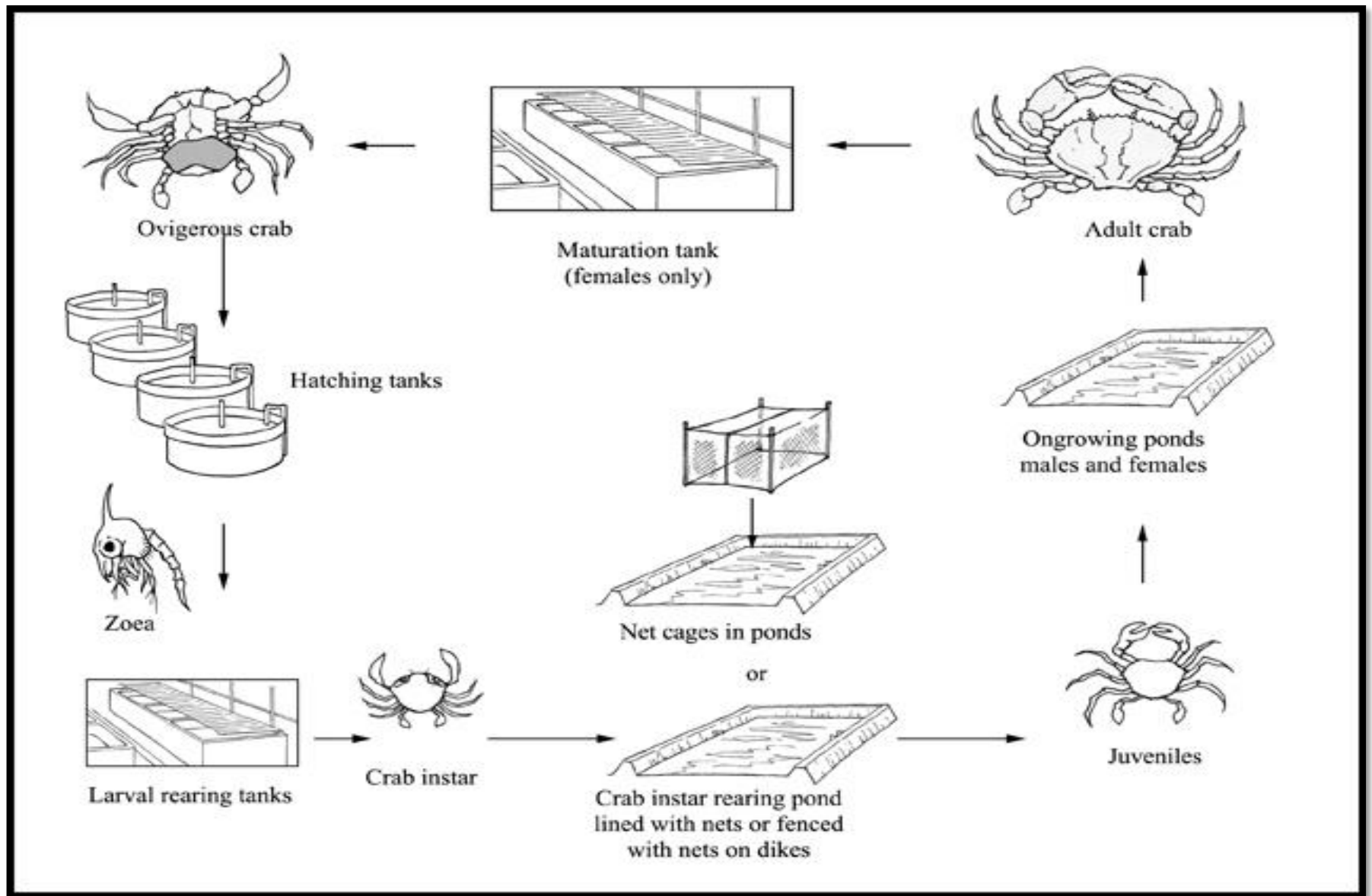
# Moulting of Crab

- The moulting process depends on body size and environmental factors. For example, moulting of big crabs takes longer than for small ones.
- Newly moulted mud crabs lose their swimming ability and sink to the bottom of the pond.
- It takes two to three hours for soft-shell individuals to regain this swimming ability.



- With each moult, shell width, shell length and body weight generally increase by about 28.4 percent, 30 percent and 41 percent respectively.
- Strong stimuli or mechanical damages often result in the loss of appendages, a process called self-cutting.
- New appendages can be regenerated several times.

# Captive rearing



# BREEDING

- The mature female releases a chemical attractant (pheromone) in to the water, which attract males.
- The successful **male picks up the female** and carries her around for several days until she molts.
- **Copulation can occur only when females are in soft shell condition**
- Male deposits Spermatophore inside the female storage sac (spermatheca) by using male first pleopods.
- The Spermatophore can **remain viable**, until fertilization takes place, for weeks or even months.

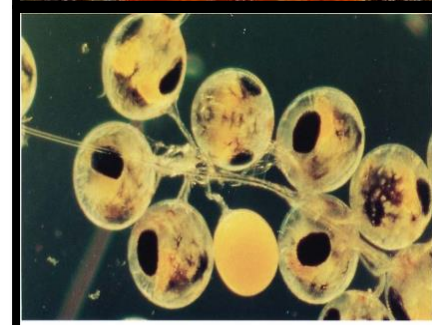


# Mating of crabs

- Generally, mating lasts for one or two days, a period which may vary from nine hours to three days.
- Mating occurs mostly at night, especially at the beginning of the high tide.
- For mating to be successful, water temperature should preferably be higher than 18°C.
- Both female and male crabs do not feed during the mating period.
- After mating, females consume a large amount of food to support rapid ovarian development.
- Under suitable conditions, ovulation may take place 30 to 40 days later.

# FERTILIZATION & SPAWNING

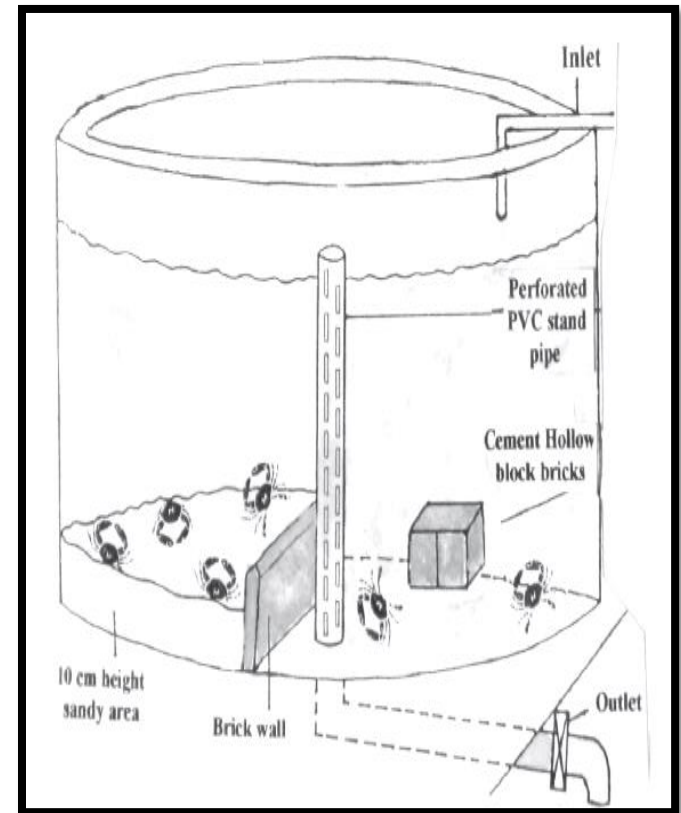
- Normally, spawning occurs early in the morning, between 5:00 -8:00 am.
- Eggs are released from the aperture genitals to meet the sperm released from the spermatheca.
- Fertilization is internal.
- Fertilized eggs stick to the bristles of the abdominal legs of the female which is then called a ***“berried” or “ovigerous” crab.***
- **Fecundity** of *scylla tranquebarica* is 2-3 million and of *scylla serrata* is 0.5 – 2.5 million.





# BREEDING TANK

- ❑ A **sandy substratum** should be provided in the spawning tank.
- ❑ Half of the broodstock tank can be provided with **10 cm sand layer** and another half can be bare floor for feeding purpose.
- ❑ Alternatively sand filled trays can be provided.
- ❑ Crabs can be stocked at the rate of 1-2 animal per sq.metre.



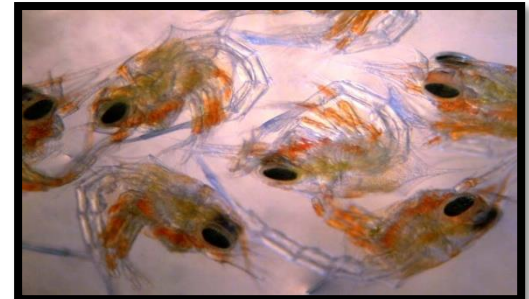
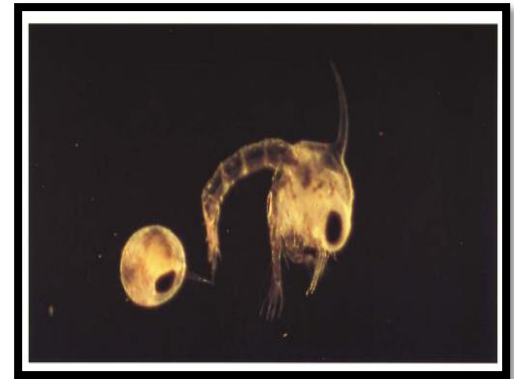
# HATCHING

- With the development of the embryos, the colour of eggs varies from **bright orange, to grey and to dark-grey.**
- When all the eggs get the dark grey colour , it indicates that the larvae will hatch soon.
- The duration of the incubation period depends on water temperature.

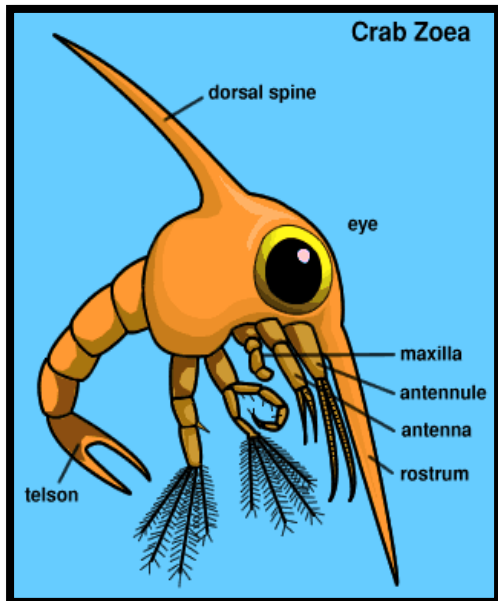
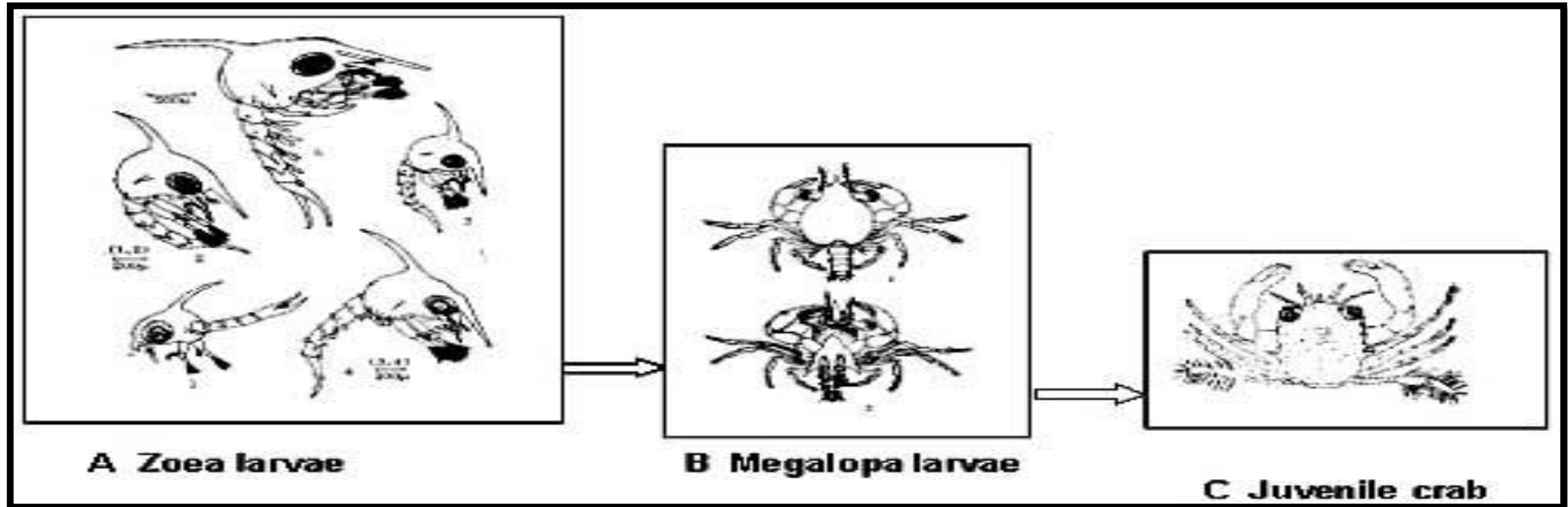


# LARVAL DEVELOPMENT

- The phototactic behaviour of the zoea larvae is used to collect them.
- Rearing tanks where stocking density varies from 20,000 to 50,000 per cubic metre.
- There are five zoeal stages passing through five molts to reach the megalopa stage.
- Zoea to megalopa 15 – 20 days (Each moult 3 - 4 days)
- The megalopa takes 8 - 11 days before it molts into the first crab stage
- The megalopa larvae gradually adapt themselves to a benthic life.



# Larval stages



**Megalopa larvae**



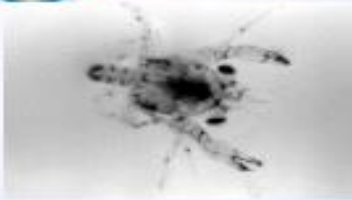
**An individual crablet**



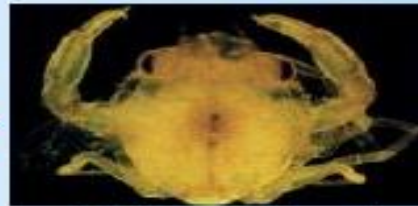
# POST HATCHERY PHASE



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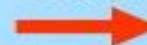


8-11 d



(0.40 – 0.45 cm)

+ 3 weeks



(0.8-1.0 cm)

Fly size crabs

**megalopa**  
(0.35-0.40 cm)



## Tanks

- 80- 100 cm deep
- area 40 m<sup>2</sup> or bigger



## Net cages

- mesh size 1 mm
- area 20 m<sup>2</sup> or bigger
- bamboo poles as support
- net bottom buried 3-5 cm into the soil
- 80- 100 cm deep



# Culture techniques

- Culture techniques have been developed for two species of mud crab *Scylla serrata* and *Scylla oceanic* ( available in mangrove and estuarine areas of Andhra Pradesh).
- Crabs are cultured in ponds or mangrove pens.
- The basic design of most earthen ponds used to culture mud crabs is the same as that used to culture marine shrimp.
- In many parts of Asia, where the profitable culture of shrimp has been affected by disease or low prices, have been converted to mud crab ponds.

- The mud crab attains sexual maturity in the period of 5 months.
- About 5 months after hatching pair formation occur between male crab and female crab.
- After Few hours mating occur.
- During mating male deposit sperm in the female.
- Sperm fertilizes the different batches of egg released by the female.
- After fertilization , fertilized egg attach to the abdomen of the female.

- Berried female is transferred to the spawning pond.
- After spawning the larva hatch out as first zoea stage and then metamorphoses into 2,3,4 & 5 zoea stages.
- Then fifth larval stage of zoea metamorphoses into megalopa stage.
- Megalopa metamorphoses into juvenile stage.
- Phytoplankton , chlorella is commonly used for feeding the zoea where as brine shrimp nauplius is commonly used for feeding the megalopa stage.
- Megalopa metamorphoses into juveniles which are then transferred into the nursery pond as a seed stock.



- Three type of pond designs for crab culture in commercial scale, one pond for culture , second pond for fattening and a third one for breeding and nursery rearing have been developed.
- In the nursery pond , the larval forms are grown up to the juvenile stage below 70 g size and then shifted into the culture pond for the further culture.
- Culture pond – Stocking and growing young ones to the marketable size of 500g and above.
- After attaining a size of 500 g and above crabs are to be transferred to the fattening pond for feeding for about 10 to 20 days before harvesting in the inter-moult and early pre-moult stage.
- Crab ponds may be sandy bottom, the size of pond may be 400-800 m<sup>2</sup> and water depth of 30 cm is enough.



- In pond bottom, ditches of 3m width and 0.5-1m depth is formed along the dykes and two ditches are made in the middle of the pond.
- These ditches provide shelter for growing crabs.
- On the dyke tops, chicken wire mesh screen of about 1m high are erected to prevent the escape of growing crabs.
- Fencing with 1.8m high bamboo matting or nylon mesh is placed obliquely about 1m inside from the edge of the dyke.
- This would prevent the crabs from escaping by climbing.

# Feeding of growing crabs

- *Scylla serrata* is a voracious feeder.
- It prefers to crawl on bottom in search of food but it may also be seen swimming on the surface of the ponds
- In ponds, the crabs feed on the naturally available algae, decaying animals, crustaceans etc.
- To enhance the growth of crabs, they are fed with trash fish, fish offals, fish visceras, snails, chank meat etc.
- The supplementary diet is given at the rate of 5-7% total body weight of growing crabs.
- Feeding is given daily especially during late evening.
- Under monoculture, survival rates of 70-90% is obtained.
- Properly fed crab, reached a carapace length of 70 mm and with of 100 mm within six months.
- Female crabs reared for 45 to 60 days have given on yield of 1000 kg/ha.