D.N.R. COLLEGE (A), BHIMAVARAM

DEPARTMENT OF AQUACULTURE

UG COURSE

PRACTICAL MANUALS

PAPER-4: FRESH WATER AND BRACKISH WATER AQUACULTUR

IMPORTANT CULTIVABLE CARPS

1.CATLA CATLA.

Phylum : chordata

Class : osteichthyes

Order : cypriniformes

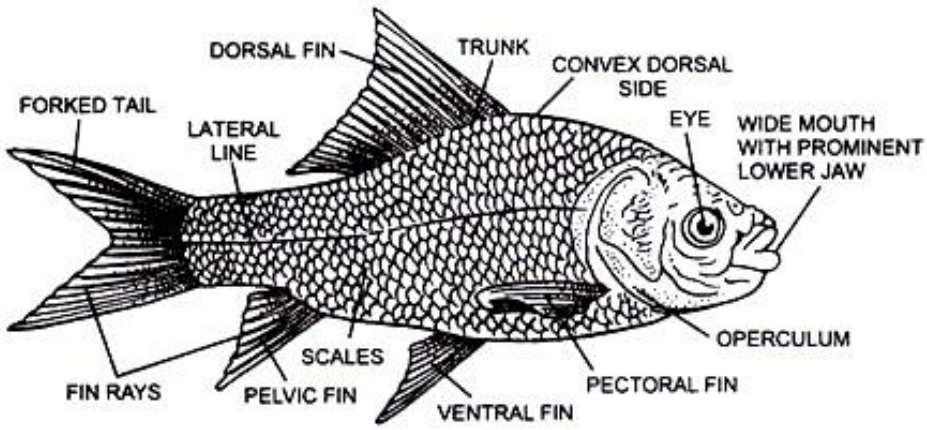


Fig. 9.3. Catla catla.

1.1. Catla catla (catla)

- It has a large conspicuous head with a deep body
- Snout is broad
- Mouth large upturned
- Lips without fringes
- Females mature at age of 2 years; males at 1- 1½ years
- It is a surface feeder feeding predominantly on zooplankton
- Catla is the fastest growing among IMCs
- Grows to 1-2 kg in a year
- Grows to over 1.5 m in length over its age.
- Breeds naturally in the rivers of North India during rainy season
- Widely distributed in India, Pakistan, Bangladesh and Myanmar
- Has been transplanted to the south Indian rivers
- Seed production through induced breeding.

2. LABEO ROHITHA .

PHYLUM : CHORDATA

CLASS : OSTEICHTHYES

ORDER : CYPRINIFORMES

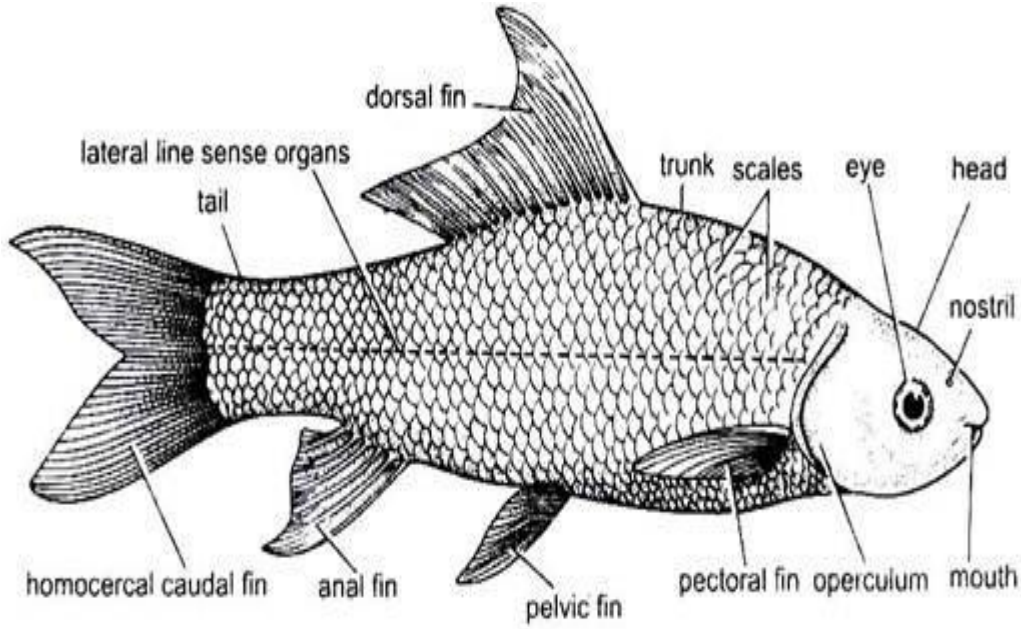


Fig. 15.1. *Labeo rohita*. External features (lateral view).

1.2.Labeo rohita (rohu)

- Small pointed head, with elongated body
- Moderately convex abdomen
- Mouth terminal with fringed lips
- Matures at the end of two years
- Column feeder feeds predominantly on phytoplankton and filamentous algae
- Breeding and distribution similar to catla
- Grows to 750-900 g in a year; growth faster second years onwards
- Grows to over 0.9 m.

3. CIRRHINUS MRIGALA .

Phylum:	Chordata
Class:	Actinopterygii
Order:	Cypriniformes

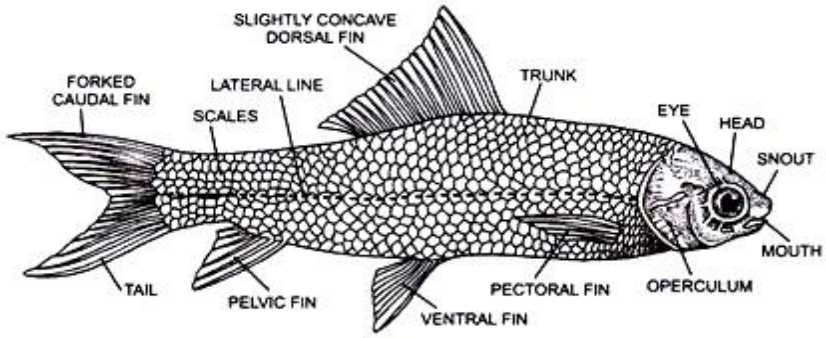


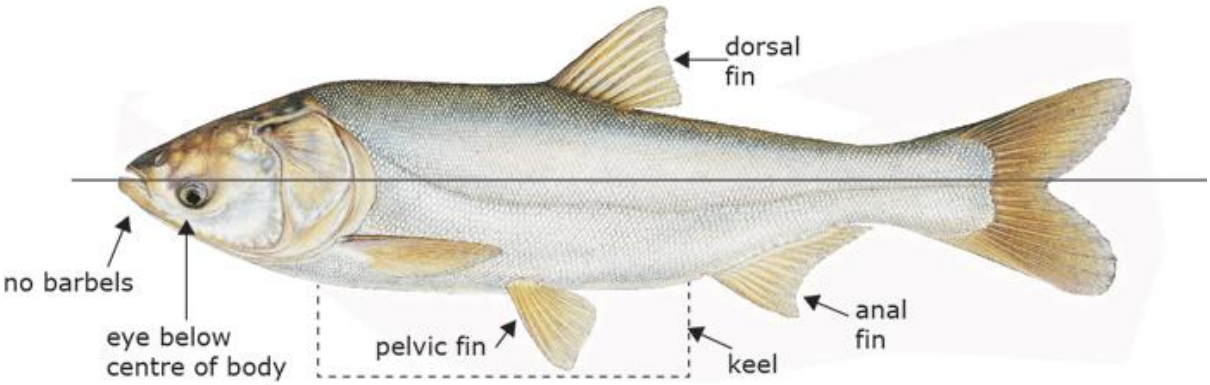
Fig. 9.4. Cirrhinus mrigala (Nain)

1.3. Cirrhinus mrigala (mrigal)

- Small head, blunt snout and elongated body
- Mouth sub-terminal, lips without fringes
- Body silvery, dark grey on back, fins orange, tinted with black
- Bottom feeder, feeds mainly on detritus
- Grows to about 700 g in 1 year
- Breeding and distribution similar to catla and rohu

4.Hypophthalamichtys moltrix.

Phylum:	Chordata
Class:	Actinopterygii
Order:	Cypriniformes

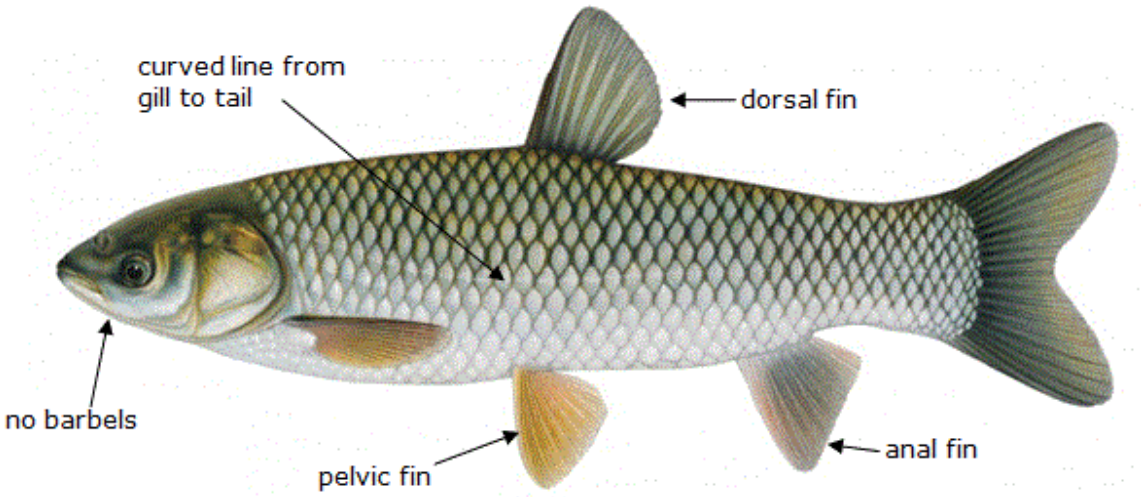


. Hyophthalmichthys molitrix (silver carp)

- Body compressed with small head
- Mouth sub-superior with lower jaw upturned
- Eyes comparatively small, situated below the horizontal body axis
- Colour of the body silvery white; dorsal brown
- Surface feeder feeding on phytoplankton
- Attains 1.5 to 2 kg in 1st year
- Max size 60 cm.

5.CTENOPHARYGODON IDELLA.

Phylum:	Chordata
Class:	Actinopterygii
Order:	Cypriniformes

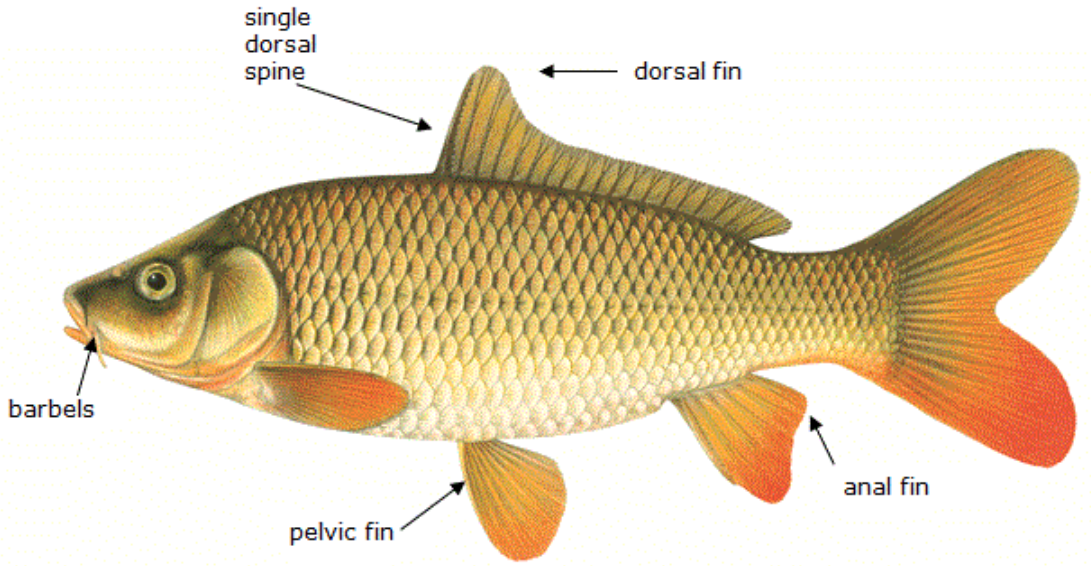


1.5. Cetnopharygodon idella (grass carp)

- Large sized, cylindrical body with a flat head
- Abdomen round scales larger
- Lower jaw shorter and eyes small
- Feeds on aquatic plants, terrestrial grass
- Feeds up to 5 times its weight per day
- Grows up to 10 kg in one year
- Max size 1.5 m/30 kg.

6.CYPRINUS CARPIO.

Phylum:	Chordata
Class:	Actinopterygii
Order:	Cypriniformes



1.6.CYPRINUS CARPIO.

- Common carp prefer large bodies of slow or standing water and soft, vegetative sediments.
- Carp are able to tolerate water with very low oxygen levels, by gulping air at the surface.
- Common carp are omnivorous. They can eat a herbivorous diet of aquatic plants, but prefer to scavenge the bottom for insects, crustaceans (including zooplankton), crawfish, and benthic worms.
- Common carp feed throughout the day with the most intensive feeding at night and around sunrise
- An egg-layer, a typical adult female can lay 300,000 eggs in a single spawn.
- The pituitary extract contains gonadotropic hormones which stimulate gonad maturation and sex steroid production, ultimately promoting reproduction.

IMPORTANT CULTIVABLE AIR- BREATHING FISHES.

1.CHANNAS STRAITUS.

Phylum:	Chordata
Class:	Actinopterygii
Order:	Anabantiformes

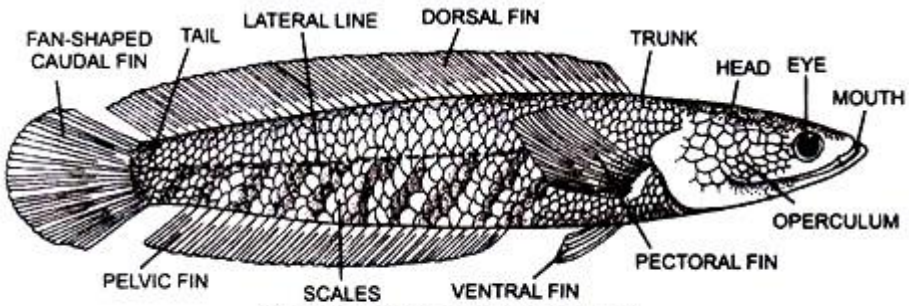


Fig. 9.10. Channa striatus (Sowra)

2.4. Channa straitus (striped murrel)

- Lower jaw longer, cleft of mouth oblique.
- A large head reminiscent of a snake's head.
- Maxilla extends beyond the posterior margin of the eye.
- Feeds on small fishes.
- Breeds in ponds, throughout the year with peak in monsoon season.
- Max size recorded 90 cm.
- Generally referred simply as mudfish.

2. CHANNAS PUNCTATUS .

Phylum:	Chordata
Class:	Actinopterygii
Order:	Anabantiformes

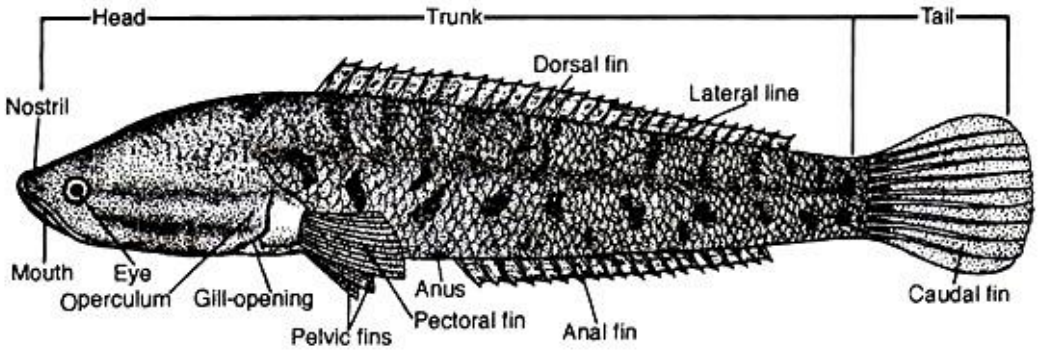


Fig. 1.49 : External features of *Channa punctatus*

. CHANNAS PUNCTATUS .

- The lata fish inhabits fresh-water ponds and ditches. It is usually carnivorous and eats other small fishes and small aquatic animals.

- The body of Channa Punctatus is elongated and covered with ctenoid scales.

- It has been recorded that cycloid scales are also present.

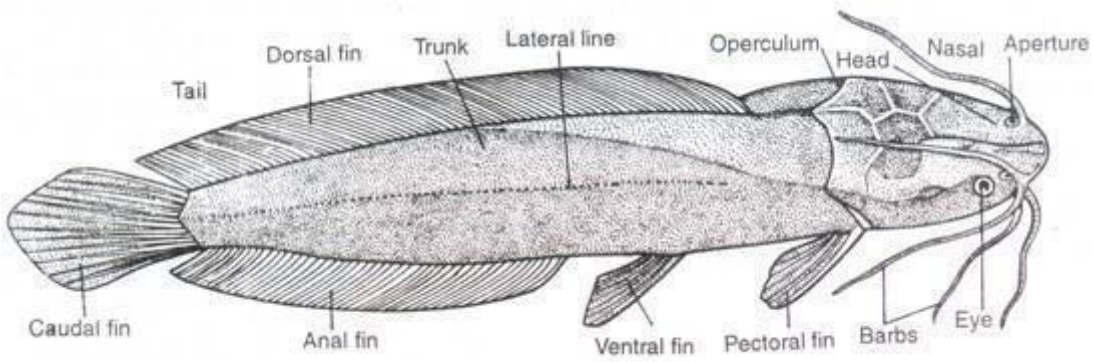
- Both the scales are systematically arranged cycloid and prectenoid.

- The body is divided into head, trunk and tail regions.

- The head is depressed and covered by large plate-like scales resembling the ‘head shields’ of snakes.

3. CLARIAS BATRACHUS.

Phylum:	Chordata
Class:	Actinopterygii
Order:	Siluriformes



2.1. Clarias batrachus (magur)

- Dorsal and anal fin long
- Pectoral fin with long serrated spine
- Head dorso-ventrally compressed
- Body round
- Widely distributed throughout the country
- Max size – 46 cm
- Attains maturity in one year
- Feeds on fish, organic debris and worms (omnivore)
- Breeds during monsoon in paddy fields, swamps and marshy areas
- Deposits eggs in a nest made in the form of depression
- Exhibits parental care

4. HETEROPHEUSTES FOSSILIS.

Phylum:	Chordata
Class:	Actinopterygii
Order:	Siluriformes

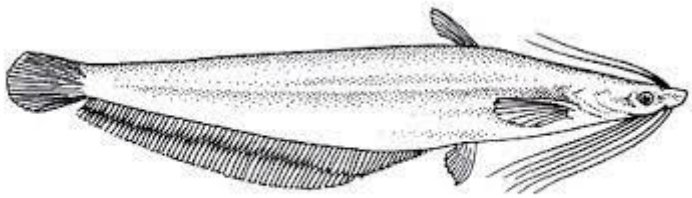


Fig. 9.7. Heteropneustes fossilis (Singhi)

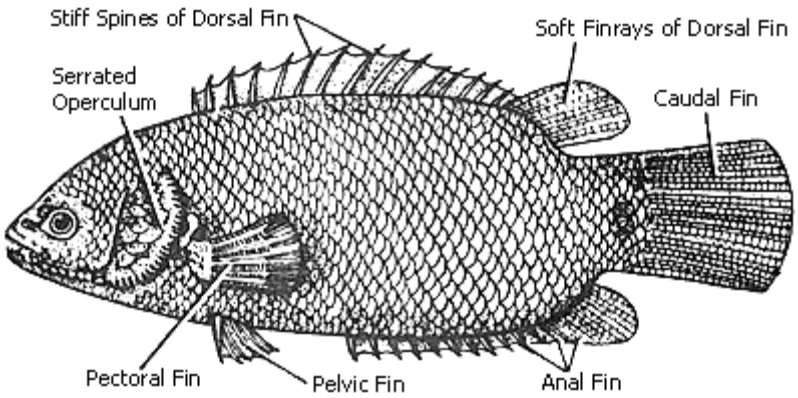
Heteropneustis fossilis (Singhi)

- Dorsal profile almost straight.
- 4 pairs of barbels, head depressed.
- Dorsal fin short and spineless.
- Pectoral spine strong, osseous and pointed.
- Feeds on insect larvae, fish and worms.
- It is omnivorous.

- It is in great demand due to its alleged medicinal value.[2]
- The stinging catfish is able to deliver a painful sting to humans. Poison from a gland on its pectoral fin spine has been known to be extremely painful.

5. ANABAS TESTUDINEUS.

Phylum:	Chordata
Class:	Actinopterygii
Order:	Anabantiformes



Climbing perch, Anabas testudineus

ANABAS TESTUDINEUS.

Body laterally compressed.

Mouth is anterior and lower jaw slightly longer.

Villi form teeth are present on jaw.

Long dorsal and anal fin is found.

Body colour is dark to pale greenish, fading to pale yellow on belly where as dorsal and caudal fin dark grey, anal and pectoral fins pale yellow, pelvic fin pale orange colour.

Pectorals and caudal fin rounded. Dorsal, pelvic and anal fin rays are modified to spin. Scales are ctenoid, lateral line interrupted

IMPORTANT CULTIVABLE FRESH WATER PRAWNS.

1. MACROBRACHIUM ROSENBERGII.

Phylum:	Arthropoda
Subphylum:	Crustacea
Class:	Malacostraca
Order:	Decapoda

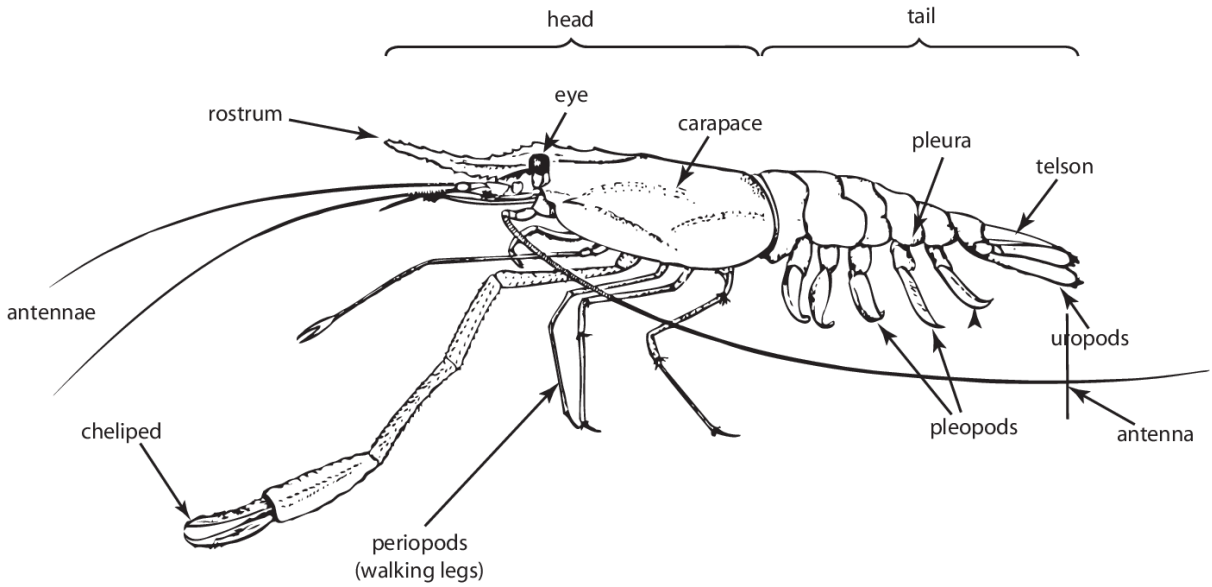


Fig. 1. External anatomy of freshwater prawn *Macrobrachium rosenbergii* (male)

MACROBRACHIUM ROSENBERGII

- ***Macrobrachium rosenbergii***, also known as the **giant river prawn** or **giant freshwater prawn**,
- *M. rosenbergii* can grow to a length over 30 cm .
- They are predominantly brownish in colour, but can vary. Smaller individuals may be greenish and display faint vertical stripes.
- The rostrum is very prominent and contains 11 to 14 dorsal teeth and 8 to 11 ventral teeth.
- The first pair of walking legs (pereiopods) is elongated and very thin, ending in delicate claws (chelipeds), which are used as feeding appendages.
- The second pair of walking legs are much larger and powerful, especially in males.
- The movable claws of the second pair of walking legs are distinctively covered in dense bristles (setae) that give them a velvety appearance.
- The colour of the claws in males varies according to their social dominance.[2][3]
- Females can be distinguished from males by their wider abdomens and smaller second pereiopods.
- The genital openings are found on the body segments containing the fifth pereiopods and the third pereiopods in males and females. [2][3]

2. MACROBRACHIUM MALCOLMSONII.

Phylum:	Arthropoda
Subphylum:	Crustacea
Class:	Malacostraca
Order:	Decapoda

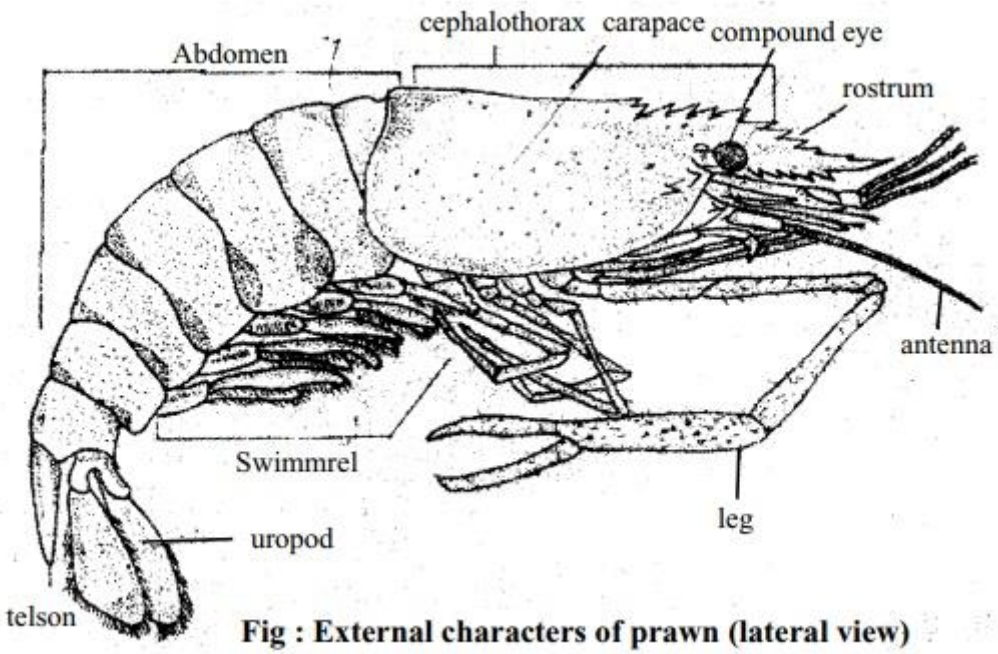


Fig : External characters of prawn (lateral view)

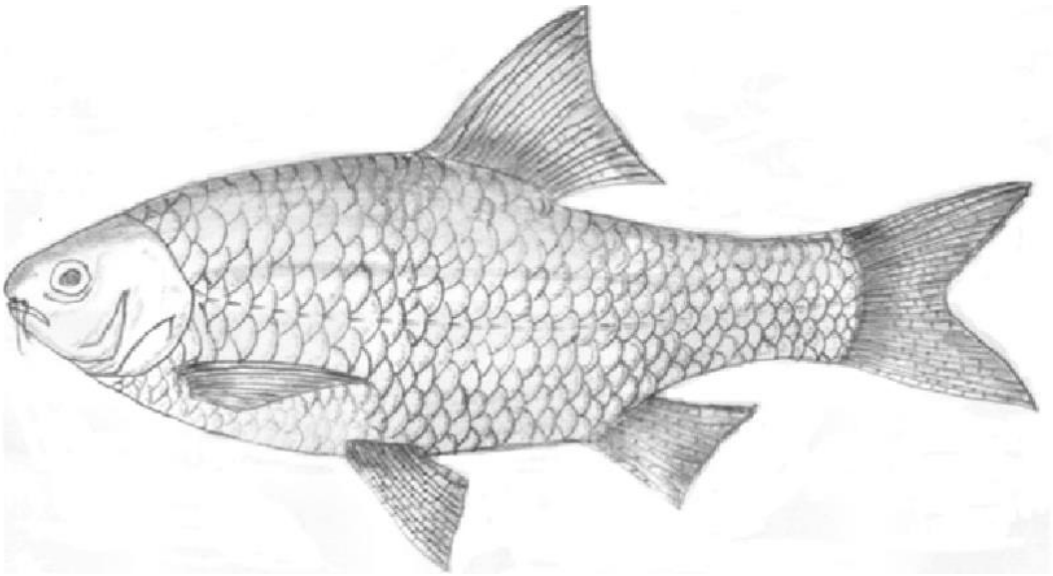
MACROBRACHIUM MALCOLMSONII.

- ***Macrobrachium malcolmsonii*** is an omnivorous, bottom-dwelling, freshwater prawn. Its common name is **monsoon river prawn**.[1]
- It feeds on decomposing plants and animals, small worms, insects, and their larvae. They are also cannibalistic in nature and may consume freshly molted conspecifics.
- *M. malcolmsonii* is nocturnal in habit and feed more actively at night.
- Being an indigenous fresh water river species *M. malcolmsonii* is more tolerant to environmental fluctuations and comparatively more resistant to contaminants.
- Males grow bigger than females, and even in the same sex there exists heterogeneity in growth.
- Those that grow faster tend to become dominant, while others remain stunted.

WEED FISHES.

1. PUNTIUS .

Phylum:	Chordata
Class:	Actinopterygii
Order:	Cypriniformes



1. PUNTIUS .

- Body fairly deep and compressed.
- Adult size small, not greater than 120 mm SL(standard length) .
- Maxillary barbel may be absent or present, no rostral barbell.
- Usually with 22–28 pored scales on flank.
- Free uroneural attached ventrolaterally to distal tip of pleurostyle; gill rakers simple.
- Body color pattern usually with a blackish spot or blotch on the caudal peduncle.

2. OXYGASTER.

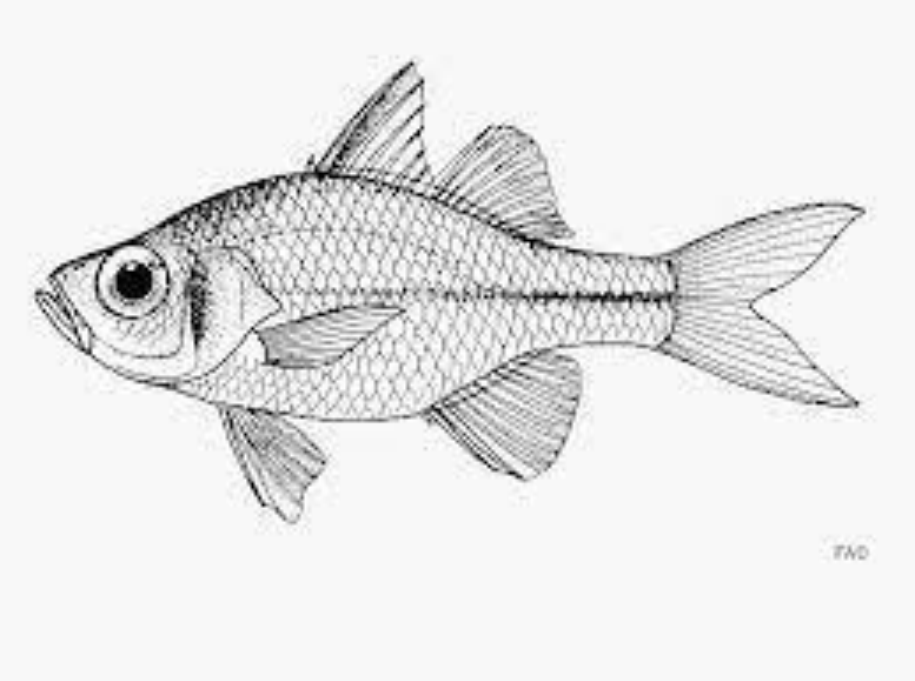
Kingdom:	Animalia
Phylum:	Chordata
Class:	Actinopterygii
Order:	Cypriniformes

1. OXYGASTER.

- These are medium-sized freshwater fishes.
- That can reach up to 200 mm SL(standard length).
- They are found near the surface in small- to medium-sized rivers in Southeast Asia.where they live off a diet of invertebrates.
- Oxygaster are stomach less fish with toothless jaws. Even so, food can be effectively chewed by the gill rakers of the specialized last gill bow.
- These pharyngeal teeth allow the fish to make chewing motions against a chewing plate formed by a bony process of the skull.
- The pharyngeal teeth are unique to each species and are used by scientists to identify species.
- Strong pharyngeal teeth allow fish such as the common carp to eat hard baits such as snails and bivalves.

2. AMBASSIS.

Phylum:	Chordata
Class:	Actinopterygii
Clade:	Percomorpha
Family:	Ambassidae



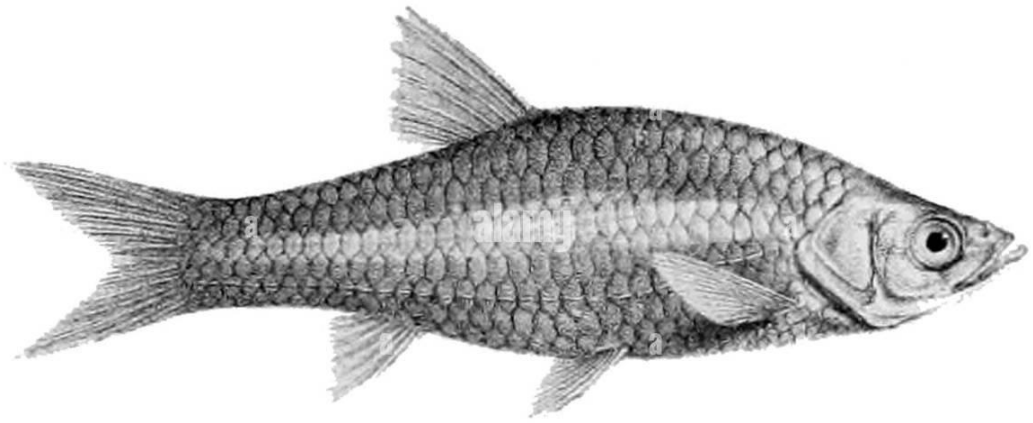
1. AMBASSIS.

- The largest species reaches a maximum size around 26 cm (10 inches).
- Ambassid fishes, commonly known as glassy perchlets, glassfish or glassies, are common and widespread throughout shallow waters of the Indo-Pacific region.
- Many of the species are noted for their transparent or semitransparent bodies.
- Several species are used as aquarium fish, noted for their transparent bodies.

Some species are known as **perchlets**

2. Rasbora .

Phylum:	Chordata
Class:	Actinopterygii
Order:	Cypriniformes
Family:	Cyprinidae



1. Rasbora .

The fishes are active, generally slender.

They have a protruding lower jaw.

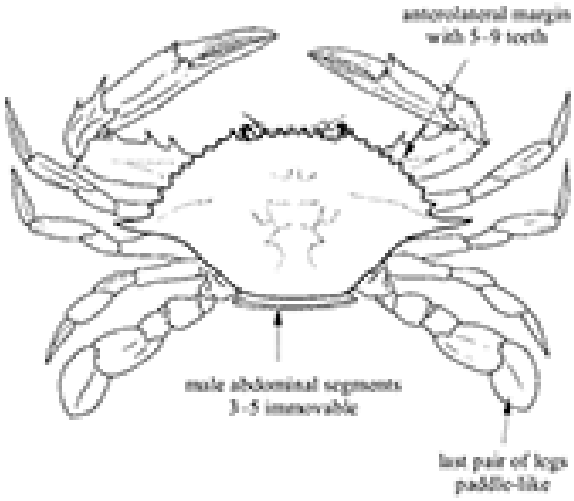
Several fishes are kept as pets.

Fish is 4–5 cm (1.5–2 inches) long with a wedge-shaped black spot on each side.

COMMERICALLY VARIABLE CARPS .

1. SCYLLA CERRATA.

Phylum:	Arthropoda
Subphylum:	Crustacea
Class:	Malacostraca
Order:	Decapoda

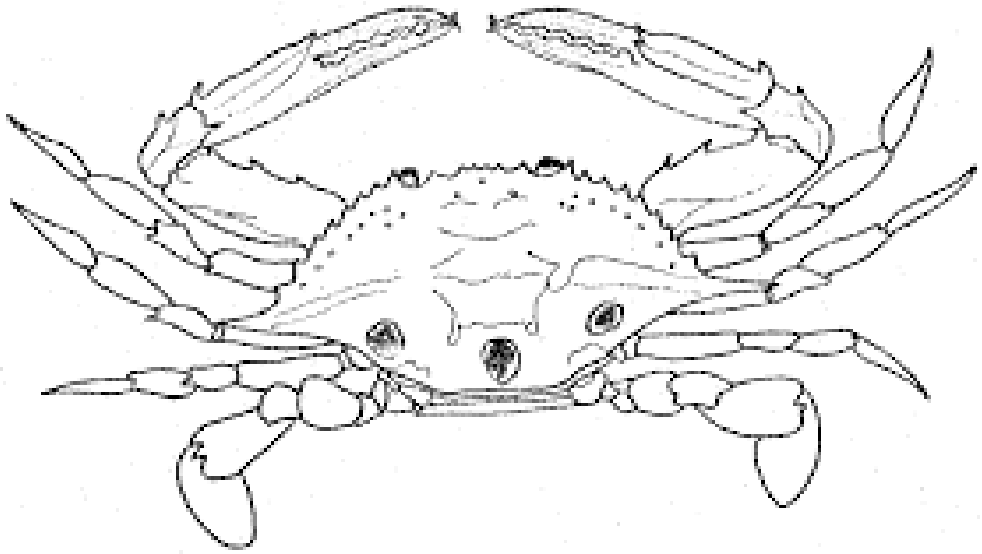


2. SCYLLA CERRATA.

- GENERALLY CALLED MUD CRAB.
- LIVE IN ESTOURN WATER BODY BROWNISH THE LATE SEGMENTED OF CHELATE COLOR.
- BODY IS DIVIDED INTO CEPHALOTHORAX AND ABDOMEN.CEPHALOTHORAX BEARS LEGS . THE FIRST PAIR CHELATED LEG.
- ABDOMEN IS TRIANGULAR SEGMENTED TURNING DOWN.
- EXHIBIT EQUAL DIMORPHISM IN MALE ABDOMEN IS THIN VARIOUS ARE ABROUD.

2.NEPTUNUS PELAGICUS.

Phylum:	Arthropoda
Subphylum:	Crustacea
Class:	Malacostraca
Order:	Decapoda



NEPTUNUS PELAGICUS.

- GENEARLLY CALLEDBLUE SHRIMP.
- LIVES IN EUSTOURINE WATER BODY BLUISH.
- BODY IS DIVIDED INTO CEPHALOTHORAX AND ABDOMEN. CEPHALOTHORAX LEGS .THE FIRST PAIR CHELATE LEG
- ABDOMEN IS TRIANGULAR SEGMENTED TURNING DOWN.

LOBOSTERS.

1. PANULIRES POLYPHAYUS .

Phylum:	Arthropoda
Subphylum:	Crustacea
Class:	Malacostraca
Order:	Decapoda

PANULIRES POLYPHAYUS.

- ***Panulirus polyphagus***, the **mud spiny lobster**, is a species of crustacean that lives on shallow rocky reefs and muddy substrates in the tropical Indo-Pacific region.

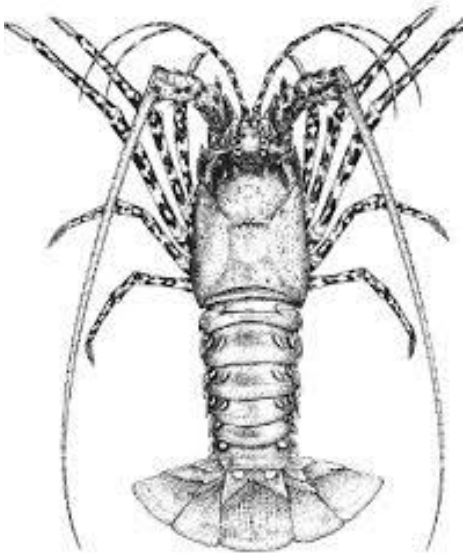
- *Panulirus polyphagus* grows to a length of about 40 cm (16 in). The antennal plate bears two large spines and there are no transverse grooves on the abdominal segments.

- Distinctive colour features by which this species can be distinguished from other spiny lobsters include a greenish-grey background colour and a thin white band near the hind edge of each segment.

- It has four large spines on the antennal plate, and smooth grooves on the abdominal segments.[3]

2. PANULIRUS ORNATUS.

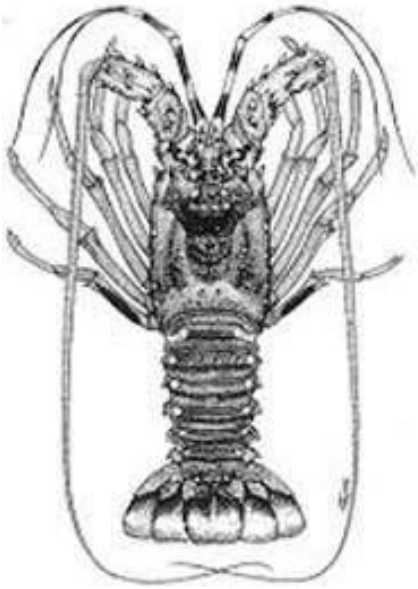
Phylum:	Arthropoda
Subphylum:	Crustacea
Class:	Malacostraca
Order:	Decapoda



- ***Panulirus ornatus*** (known by a number of common names, including **tropical rock lobster**,
- ***it*** is a large edible spiny lobster with 11 larval stages that has been successfully bred in captivity.
- The ornate rock lobster is a large specimen with a blue-green carapace.
- It is characterized by its large frontal horns, as well as distinct patterning with stripes and spots of various colors throughout its body
- Its walking legs have intricate stripe patterns, making it appear almost spider-like.

3. PANULIRUS HOMARUS

Phylum:	Arthropoda
Subphylum:	Crustacea
Class:	Malacostraca
Order:	Decapoda

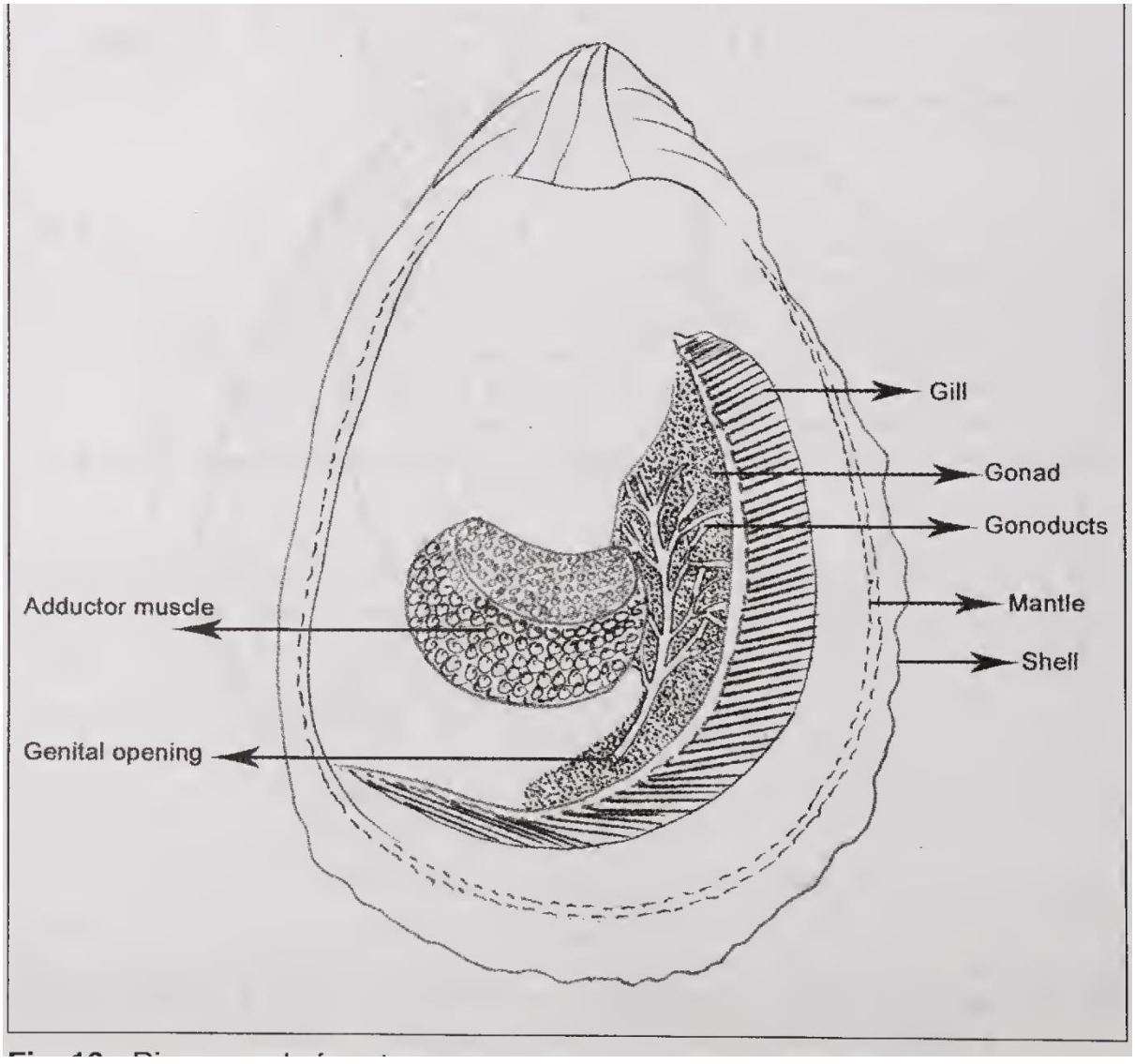


- ***Panulirus homarus*** is a species of spiny lobster that lives along the coasts of the Indian and Pacific Oceans. It lives in shallow water, and feeds on the brown mussel *Perna perna*
- . It typically grows to a length of 20–25 cm (7.9–9.8 in).
- There is variation in the colouration, which parallels other morphological differences; most animals are dark green and have only very small squamae in the grooves of the abdominal tergites
- Other animals are red, and have much more prominent sculpturation in the grooves on the abdominal tergites.[4]
- The green form is known as the *microsculpta* form, and the red form as the *megasculpta* form.[4]

IDENTIFICATION OF THE OYSTERS OF NUTRITIONAL SIGNIFICANCES.

1.CROSSOSTERA MADRASENSIS.

Phylum:	Mollusca
Class:	Bivalvia
Order:	Ostreida
Family:	Ostreidae

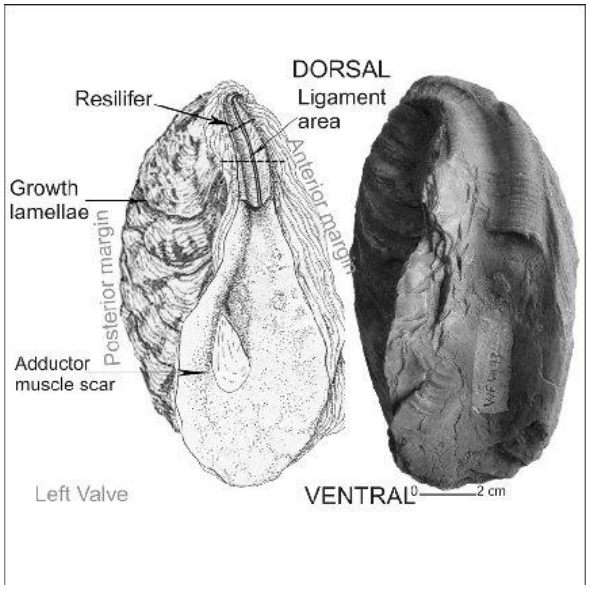

Gill
Gonad
Gonoducts
Mantle
Shell
Adductor muscle
Genital opening

CROSSOSTERA MADRASENSIS.

- Colour usually whistish with purple streaks and spots radiating aways from the umbo.
- The shape of the varies with the environment.
- Shell solid inequivalve extremely rough extensively fluted and laminated
- Left (lower) valve deeply cupped ,its sides sometimes almost vertical , the right (upper) valve flat or slightly convex sitting withing left.

2. CROSSOSTREA GRYPHOIDES .

Phylum:	Mollusca
Class:	Bivalvia
Order:	Ostreida
Family:	Ostreidae



- A concentration of heavy, thick-shelled, large-sized, and elongated population of the oyster *Crassostrea gryphoides*
- it was recorded in shallow-marine deposits of the basal Oasis Member of the Middle Miocene Marmarica Formation exposed at Siwa Oasis, Egypt.
- The oyster assemblage is resedimented as a lens-shaped bank up to 80–100 cm thick and about 220 m long.
- *Crassostrea gryphoides* specimens are embedded in a yellowish green, soft marl matrix.