Semester-III ZOO CC305
Self learning
PARENTAL CARE IN FISHES

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OBJECTIVES

At the end of the lesson, the students will be able to :

- define Parental Care
- explain parental Care in fishes
- list the different modes of Parental Care in fishes
- elucidate how they protect their eggs and young ones
- give examples and draw different diagrams of fishes
- list the advantages of Parental Care in fishes.

•INTRODUCTION

•Looking after the eggs or young until they are independent to defend themselves from predators is known as parental care.

•The continuation of race is made possible by rearing of the offspring. Male and female giving food, shelter and protection to their off springs is parental behaviour.

Definition

•Parental care behaviour is any behaviour performed after breeding by one or both parents, that contributes to the survival of their offspring. Parental care is a form of **altruism** (unselfish concern for other) in spending time and energy to aid its offspring. The degree of parental care varies considerably, from species to species and depends upon the number of offspring produced.

•**Fishes** as a group pay little parental care to their eggs and young. Most of them are content to ensure fertilization of their eggs but bestow little attention on them.

•This lack of parental behaviour is correlated with production of great number of eggs and sperms. There are however, some notable exception in which the eggs and young are guarded with great solicitude mostly by the male parent.

Fishes have adopted various devices to ensure proper development of the eggs into adults

- The eggs and newly hatched young are maintained on the plants, under stones, in excavated pits and so on.

- Some are carried in the parent’s mouth.

- Fishes have evolved many means of affording care to fertilized eggs and young ones by one or both sexes.

•**Scattering eggs over aquatic plants:**

In some fishes such as pikes, *Esox lucius;* Carps, *Cyprinus carpio, Carrassius auratus etc. ,eggs are* scattered usually over aquatic plants to which they are attached.

•**Depostion of eggs in masses of definite forms:**

In many Carps, eggs are usually laid with some special sticky covering by means of which they are attached. yellow perch (*Perca flavescens*) deposit their eggs in single mass in hallow rope like structure. The eggs are held together and form floating bands.

Fig: Deposition of eggs in masses.

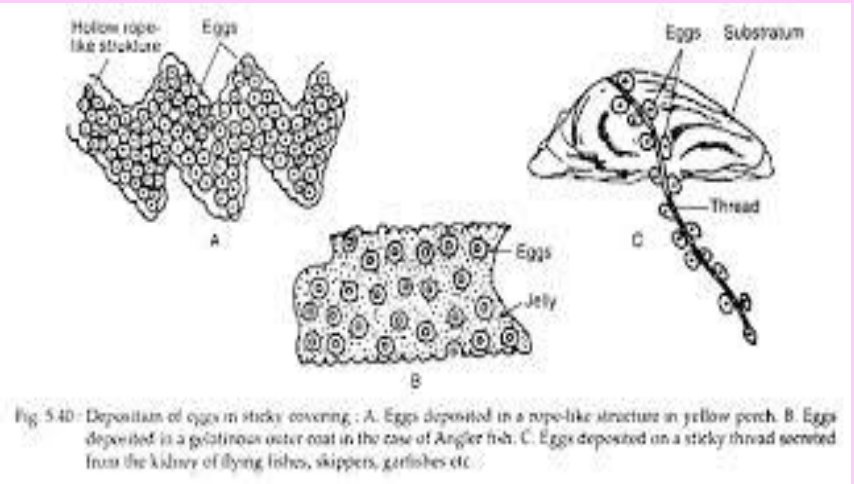


Fig. 5.40 : Deposition of eggs in sticky covering : A. Eggs deposited in a rope-like structure in yellow perch. B. Eggs deposited in a gelatinous outer coat in the case of Angler fish. C. Eggs deposited on a sticky thread secreted from the kidney of flying fishes, skippers, garfishes etc.

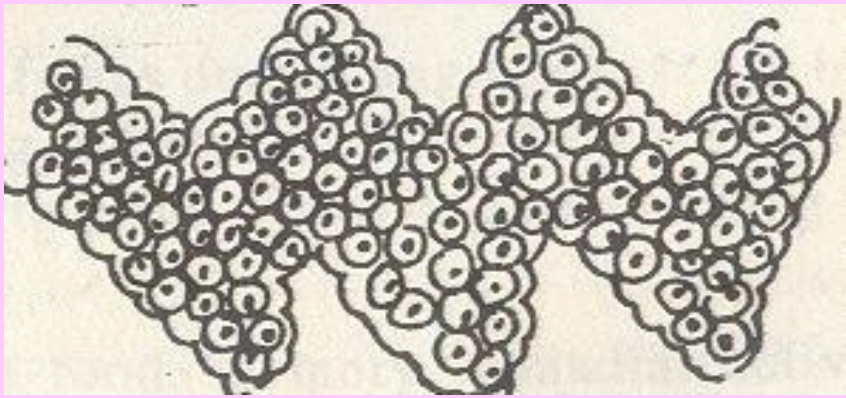


Diagram showing a rope of single mass of eggs of *Perca flavescens*

Laying of eggs at suitable places

- *Salmo solar,Acipenser,Oncorhyncus* choose suitable place for spawning.
- They dig excavation in gravel substrate,lay eggs in the pits, cover them with gravels.

Nest building

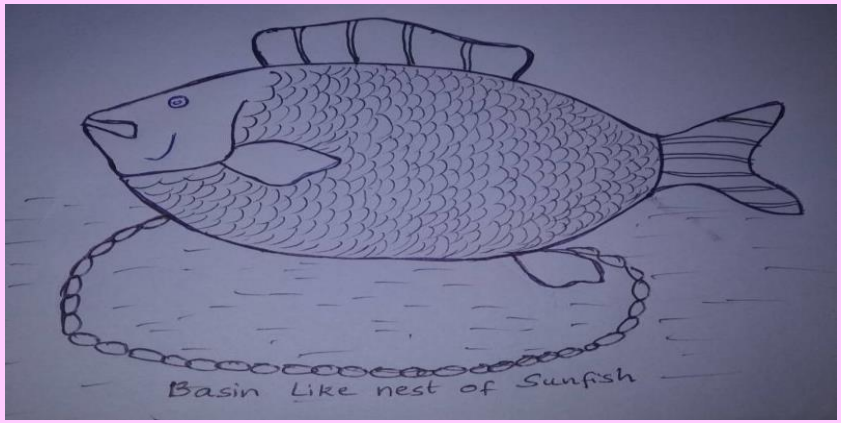
•The nest building provides suitable and safe place for the development of their young. Nests are bulit with various kinds of materials such as stones, aquatic vegetations ,secretion of their body etc.

•Simple nests of fishes are merely hallowed out depressed in the bottom as in the lung fishes. Male of many species such as darter (*Etheostoma congregate*), sunfishes and cichlids prepare a shallow basin like nest and the male remains on guard till the young ones are hatched.

In some species of north American cat-fishes (Amiuridae) both male and female prepare a crude nest in the mud for egg laying.

•American cyprinids make a nest composed of large heap of stones.

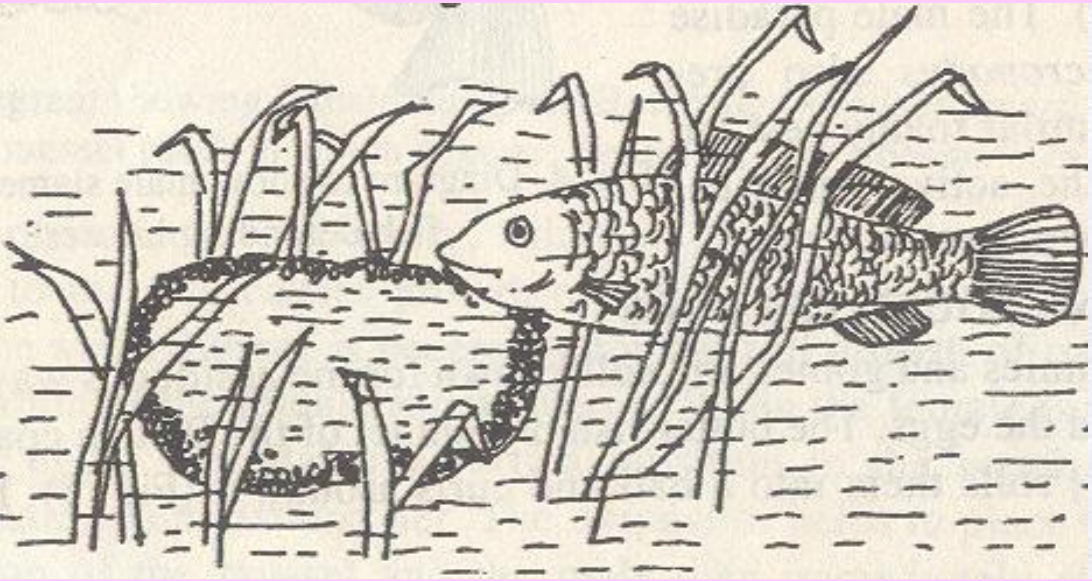
•The sunfishes also scoop out a shallow basin-like nest from the bottom of which all pebbles are removed by male who guards the eggs till they hatch.

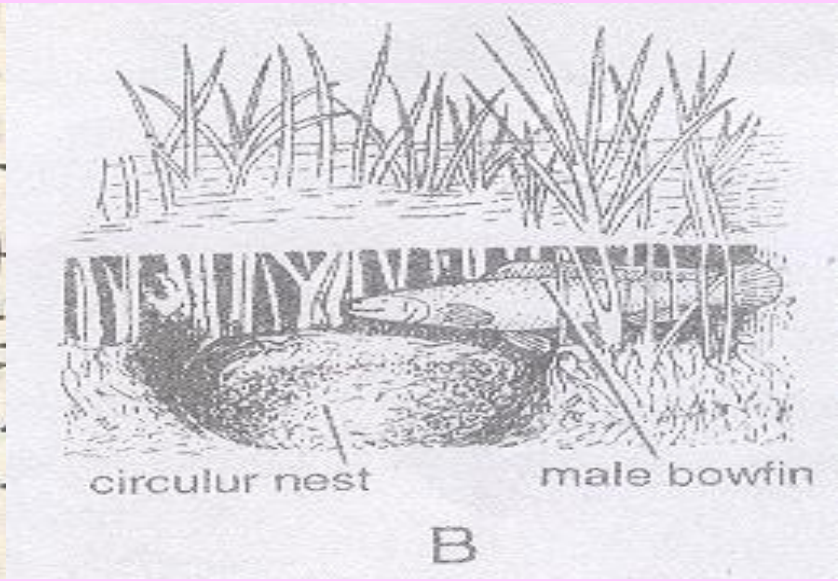


•Some fresh water fishes (Heterotis) make a nest by clearing aquatic vegetation. The *Gymnarcuhes* constructs a floating nest, *Protopterus* scoops out a hole in the mud of a swamp surrounded by long aquatic weeds and grasses.

•The South African lung fish *Lepidosiren* also prepares a nest in the form of a burrow and the male develops highly vascularized filaments on its pelvic fin for aeration.

•The male bowfin (*Amia calva*) constructs a crude circular nest made of aquatic vegetation. The male stands on guard till the young ones are hatched. The young ones leaves the nest only under the protection of the father.





Male *Amia calva* providing protection to the young ones

*Gasterosteus aculeatus (*Three spined stickle back) builds an elaborate nests. The male collects pieces of roots and stalks aquatic plants joins them by a sticky secretion produced by the kidney of male.

The nest is a hallow barrel shaped.

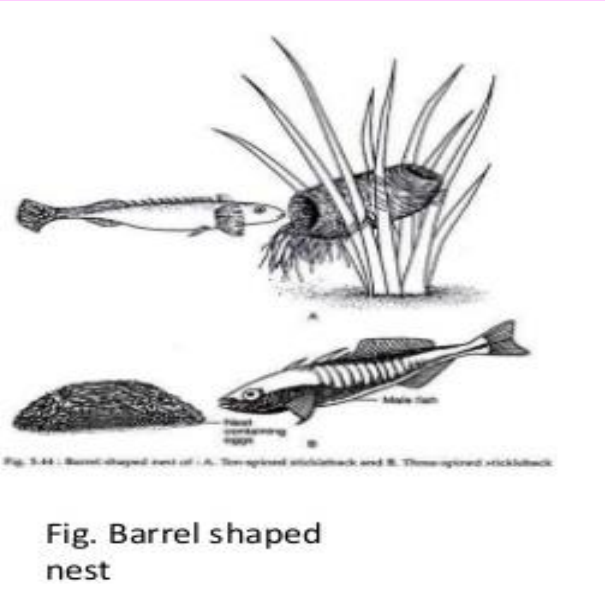
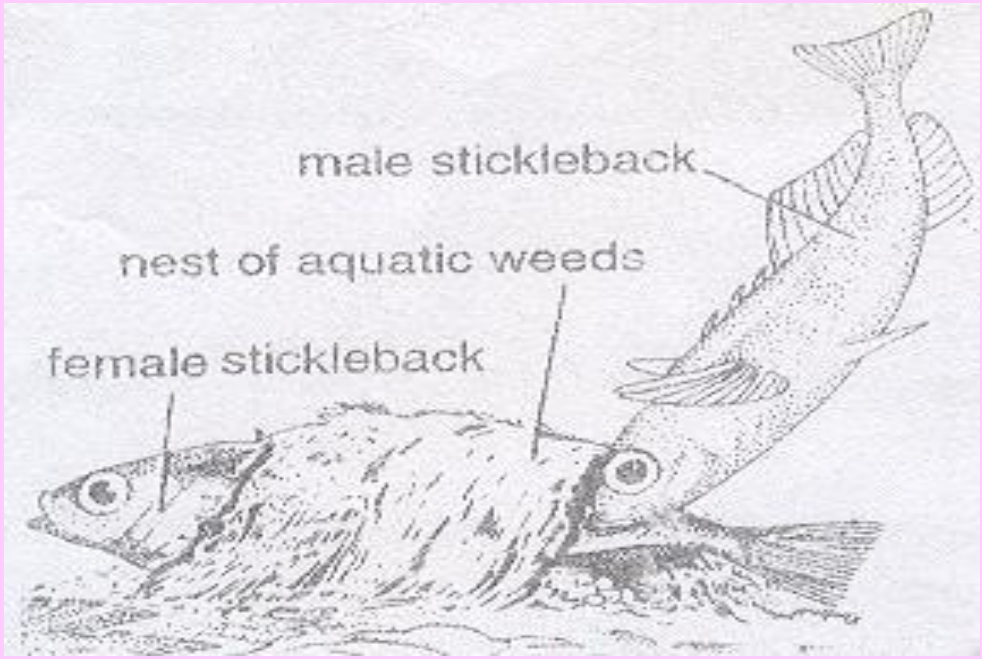


Fig. Barrel shaped nest

Two-spined male Stickleback caring fertilized eggs laid in the nest

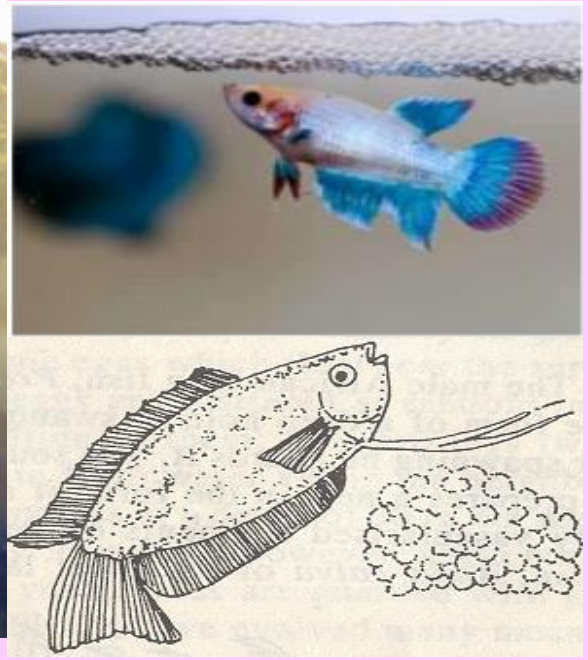
- Male drives and induces the female into the nest for laying eggs and then chases her away, enters the nests,fertilizes the eggs and guards them from intruders.



Floating nest or foamy nest:

• Floating nests are made by American cat fishes in which the eggs are suspended in a mass of bubbles and mucus .

•The male Siamese fighting fish (*Betta splendens)* too builds a floating nest and sticks the fertilized eggs to the lower surface of foamy .It stays on guard and fights till death to defend it.



Male Siamese fighting fish defending his nest

•The Paradise fish (*Macropodus*) prepares foamy nests.

•The most elaborate nest is made by *Apelts quadracus* its cup-shaped nest is attached to rooted plants close to the bottom.

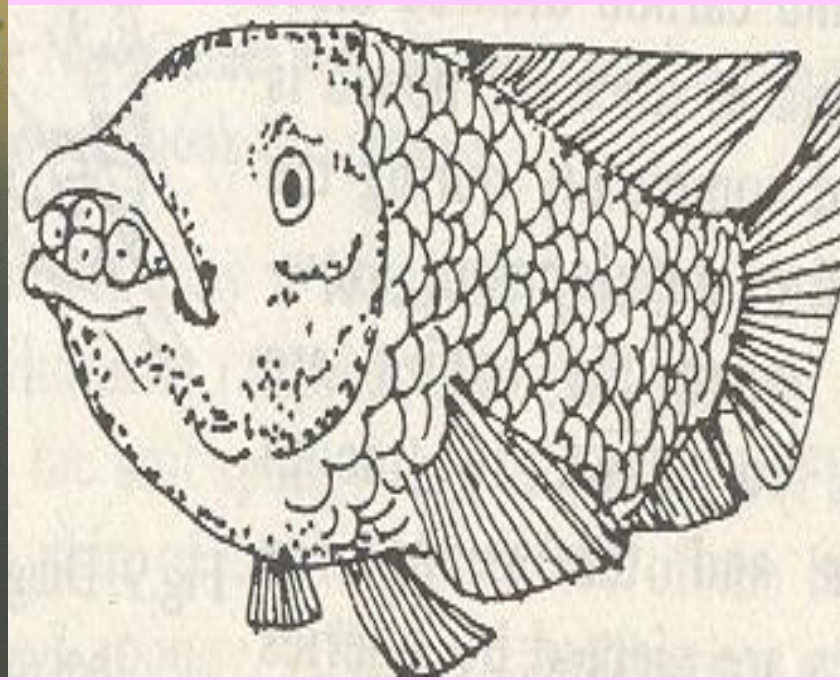
•After eggs are laid the male builds an extension of the nest up and over the eggs.

•The second clutch of eggs are laid on the new floor.

•This procedure is and several clutches of eggs are stacked within a single multitier nests (Rowland 1974)

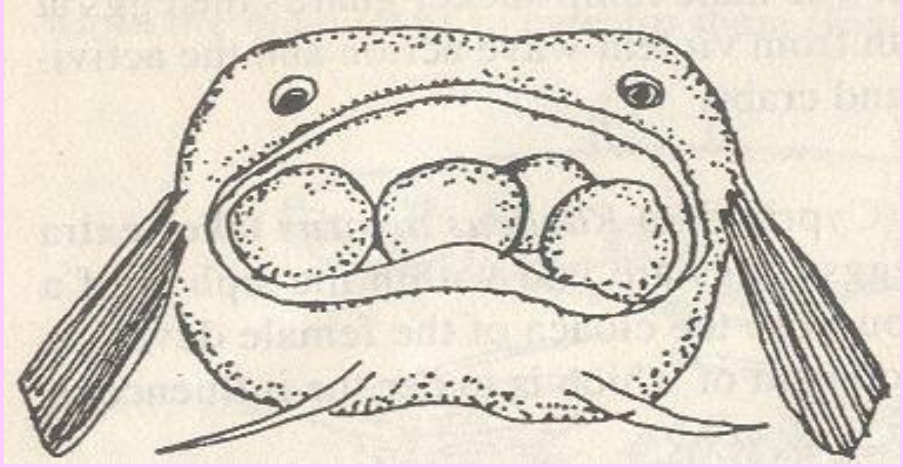
Egg brooding in mouth and intestine

The female *Tilapia mossambica* broods the fertilized eggs in her mouth. She allows the young to take refuge in her buccal cavity for some days after hatching.



mouth brooding (oral incubation) (*Tilapia)*

- North American male sea catfish (*Galeichthys felis*) carries eggs in the mouth for nearly six weeks.
- The eggs are large and relatively few in number.
- During period the brooder fish do not take any food, thus exhibiting great degree of self-sacrifice.
- *Tachysurus* keeps the fertilized eggs in its intestine till hatching occurs.



Male North American catfish (*Galeichthys felis*) carrying eggs in his mouth

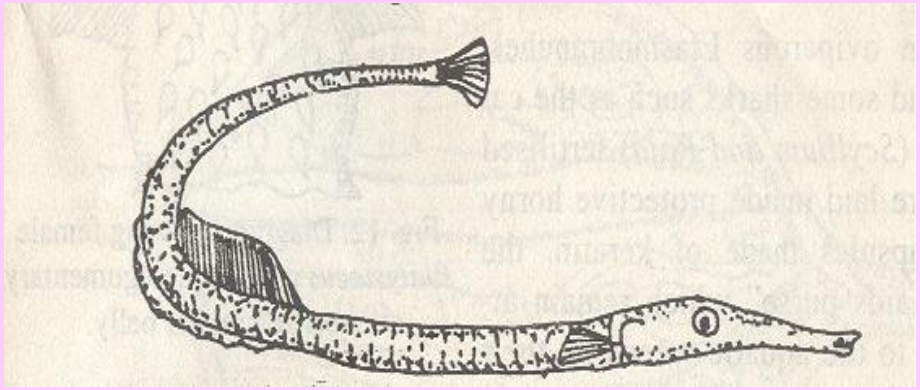
Jaw fish carrying eggs in its mouth

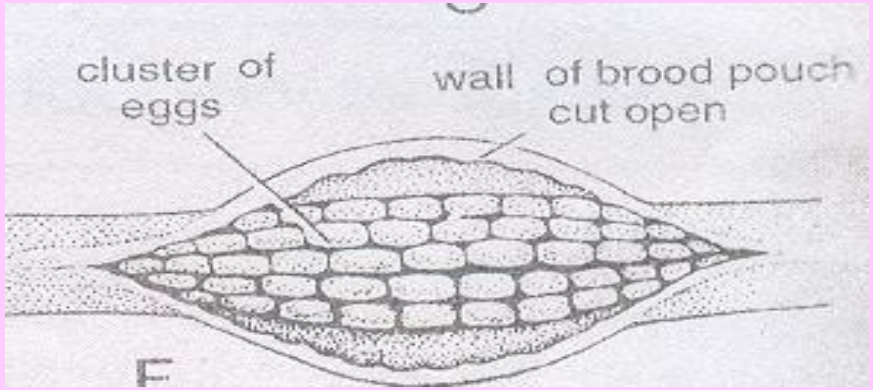
- The female Cichlids protect their eggs by carrying them in their mouths.
- This ensures safety and also perfects aeration.
- The males of most of the marine cat fishes (Ariidae) and also cardinal fishes have similar habits of carrying the eggs in oral cavity.

- The male of Brazalian cat-fish *(Loricaria typus)* develops an enlarged lower lips forming a sort of pouch in which labial incubation takes places

•In the male pipe-fish (*Syngnathus acus)* the eggs are either glued to a single groove lined with soft skin on the ventral face of the abdomen or kept in a special pouch closed by flaps of skin on the under surface of trunk or tail.

• Fry may get shelter till they are able to swim freely in the sea. They may return to this shelter when danger threatens.

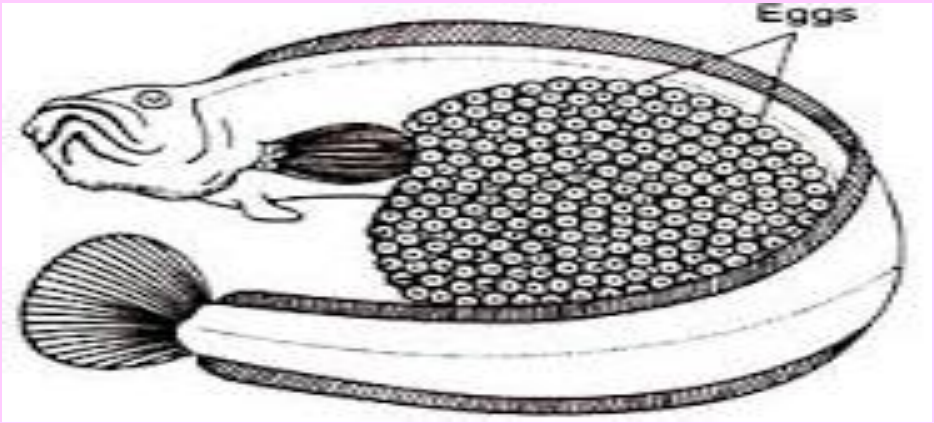




Male pipe-fish (*syngnathus)* having brood pouch on his under side

Coiling round the eggs:

The butter fish (***Pholis gunnellus***) rolls all eggs into a ball and curls around it. Very often it is done by male.

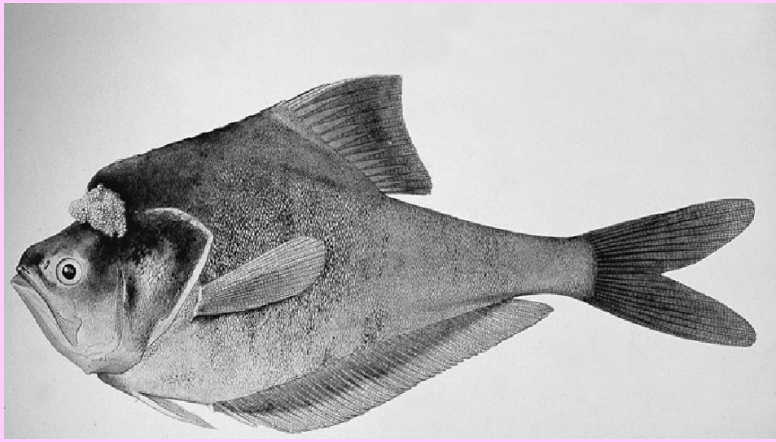


Butter fish (*Pholis gunnellus)* coilling round the eggs

The eggs of skippers, Gar fishes and flying fishes have sticky threads, developed which serve to anchor them to foreign objects or become entangled with other eggs of the same species

Attachment of egg to body

The male nursery fish (***Kurtus***) of New Guinea, carries eggs held in cephalic hook.The cluster of eggs hang on the hooks with the help of string.



Male New Guinea fish (*Kurtus)* carrying eggs mass entagled on a hook-like process.

Formation of integument cups:

•The cat fish Platystacus, the skin of the ventral surface of the body of the female becomes soft and spongy, during breeding season.

•As soon as the eggs are fertilized the female presses her body against the eggs in such a manner that each egg are lodged in the small integumentary depressions.

•Each egg is attached by a inconspicuous stalk.

•They remain in this position till hatching.

Platystacus carrying integumentary cups (IC) on h

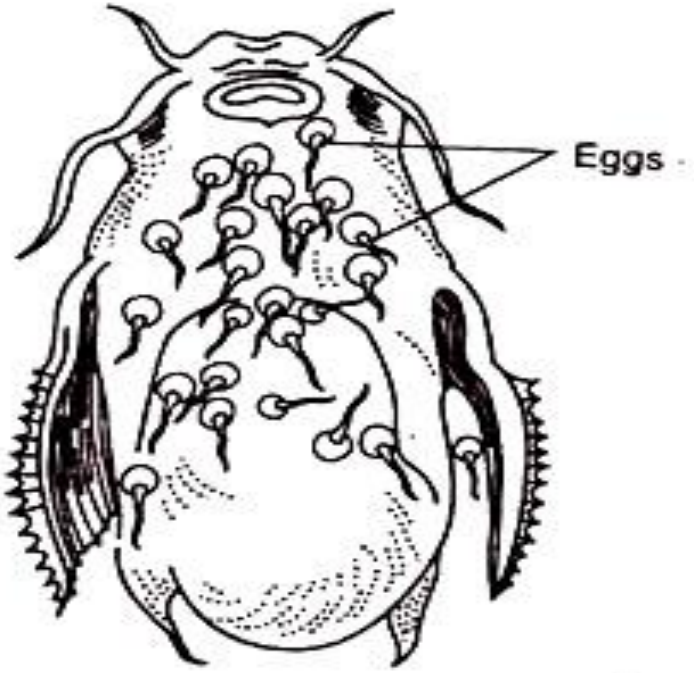


Fig. 17.5 : Parental care by female obstetrical cat fish

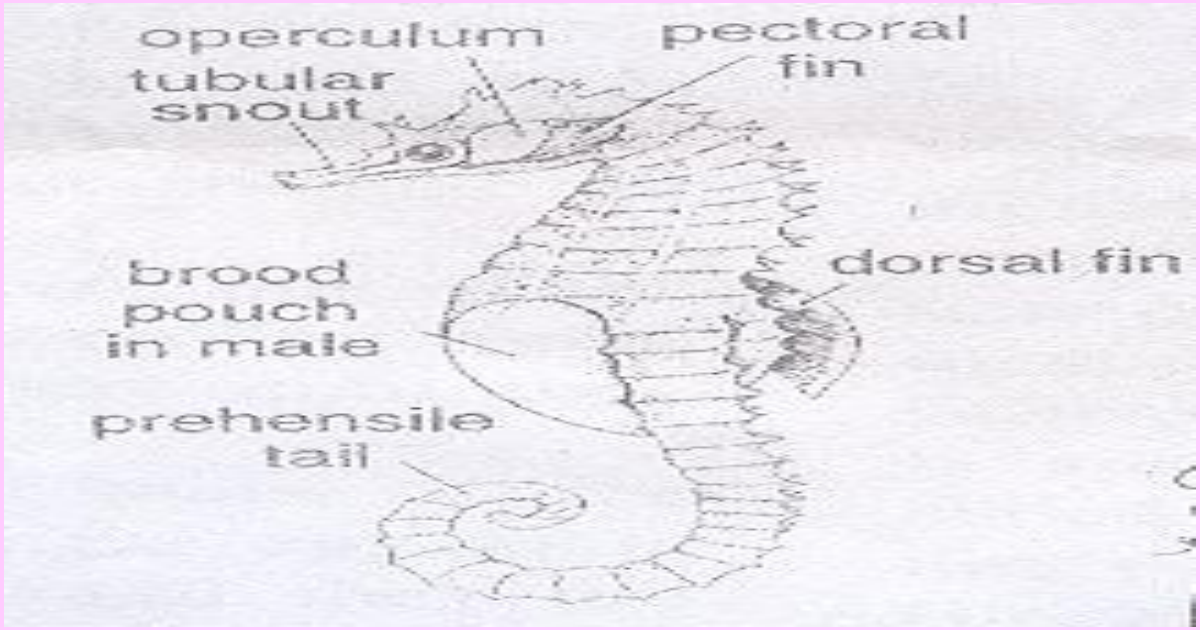
In Siluroids (*Aspredo* and *Platystacus)* the eggs are pressed into soft and spongy skin of female and are carried about.

Placement of eggs in brood pouches :

•The male sea horse carry eggs in a brood pouch on the abdomen.

•In sea horse (*Hippocampus)* fertilized eggs are transferred by the female into the brood pouch on the belly of the male. These eggs are carried by males until their hatching.

•Eggs become embedded in the folds of the brood pouch and for the exchange of respiratory gases a sort of placenta is formed.

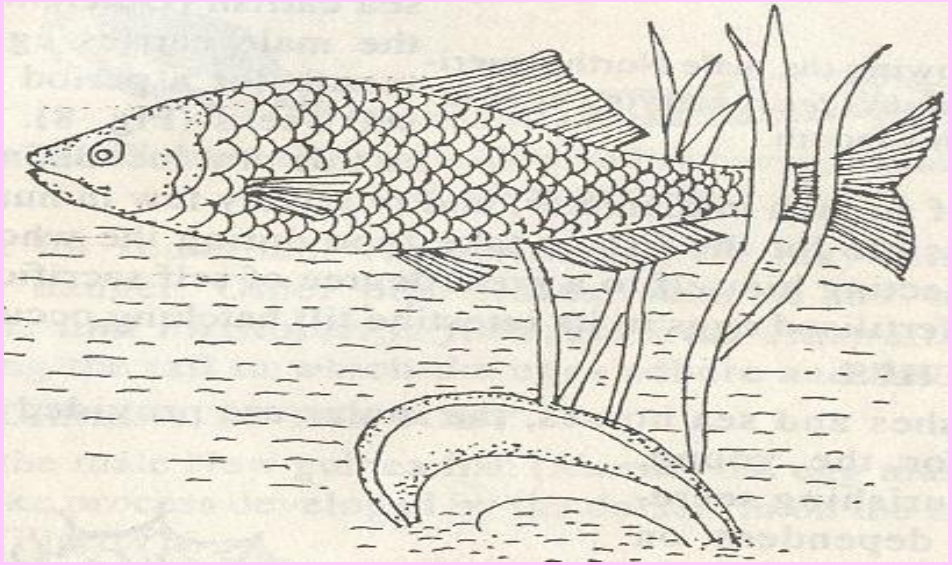


Male *Hippocampus*


Biopbeet

Deposition of eggs by ovipositor:

The eggs of bitterling (*Rhodeus*) are deposited in the mantle cavity of fresh water mussels by the female whose oviduct is drawn out in the form of a long tube acting as an ovipositor.



Ovipoistion by European female bitterling in swan mussel

•The lamp suckers(Caraproctus) deposits eggs beneath the carapace of Kamchatka crab.

Egg capsules:

•Some of the type of sharks and rays produce a special leathery case called mermaid purse. It is a shell secreted by the shell gland of oviduct. The shape of the purse varies in different groups but the function is the same that is protection

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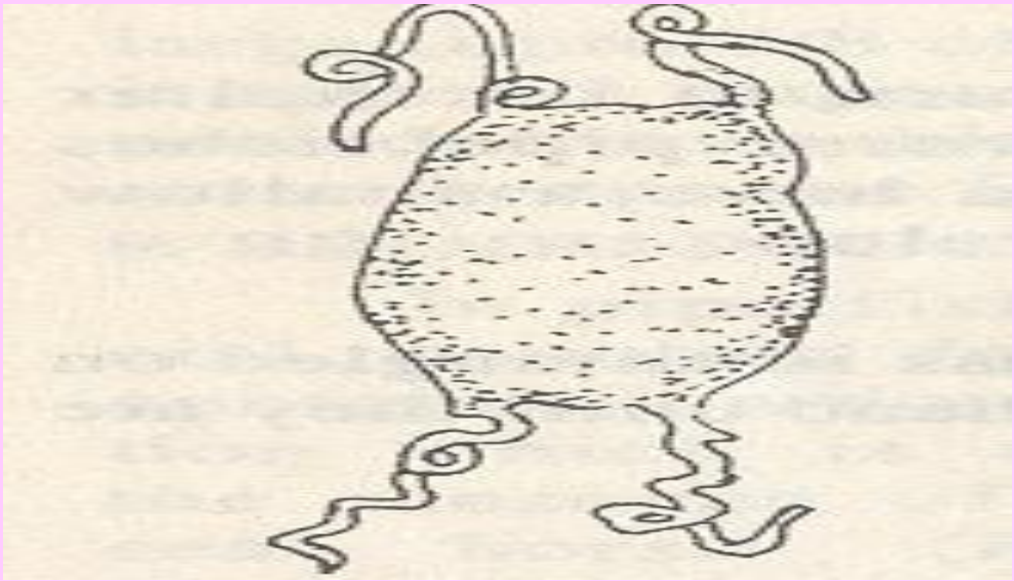
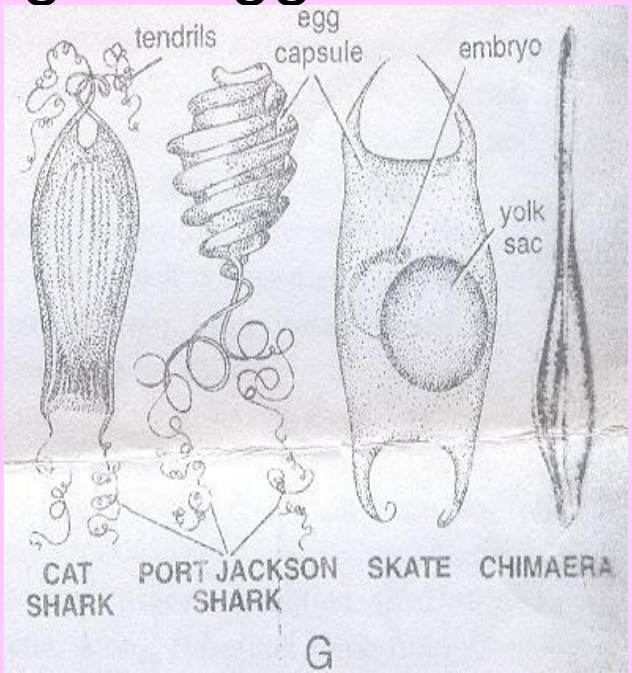


A horny egg capsule of cat shark

- In the oviparous Elasmobranche such as rays and cat Sharks (*Scyllium* and *Raja*) fertilized eggs are laid inside protective horny egg capsules called Mermaids purse. This capsule remains attached to the aquatic weeds by their tendrils. The development proceeds inside the capsule until the yolk has been used up. The youngs hatch out after rupturing off egg case.

Fig. mermaid's purses of elasmobranchs



Viviparity: (True internal incubation)

The highest degree of parental care is found in ovoviparous and viviparous fishes. In these embryos nutrition is obtained by forming yolk sac placenta in most case. Among the sharks, scoliodon is ovoviviparous.

Cyprinodonts and Perciformes of order teleosts. Some species like *Zoarces, Gambusia* and *Poicilia*, show internal fertilization.

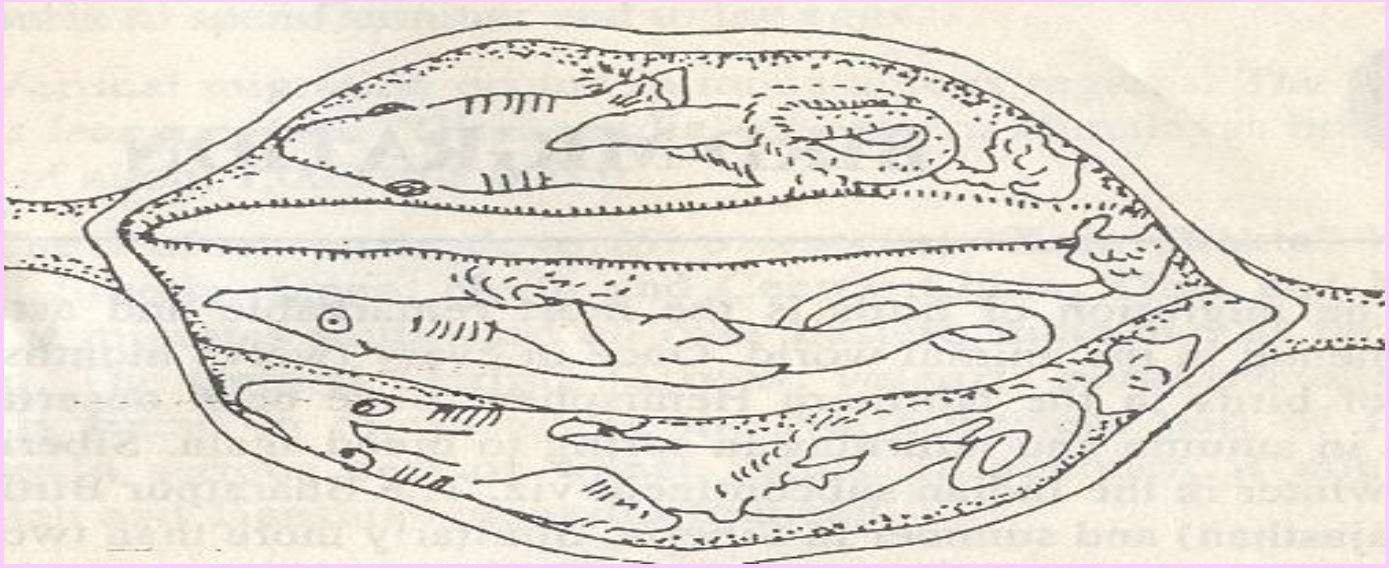
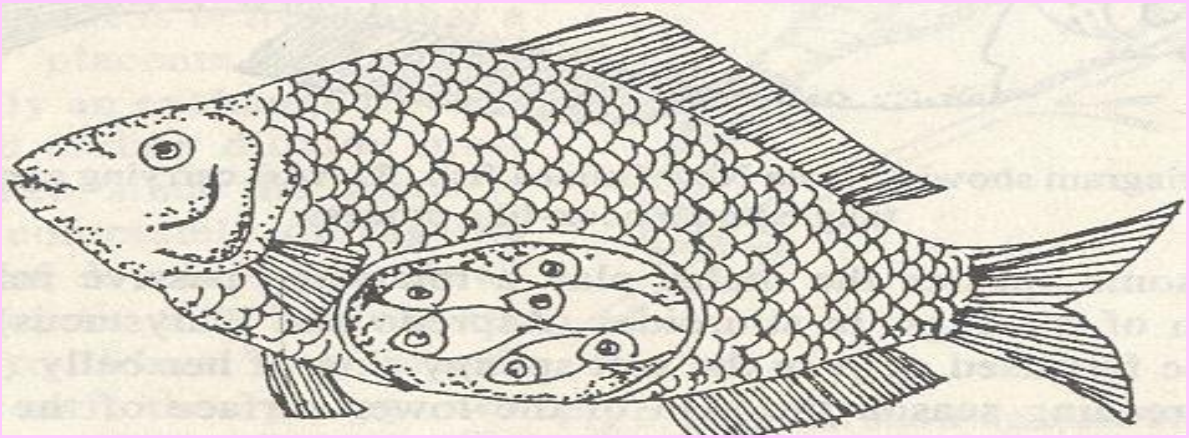


Diagram showing yolk-sac Placenta

In Shiner surf-perch (*Cymatogaster aggregata*) also the eggs are fertilized in ovarian follicles but are soon released into the cavity and are nominated by a secretion from the ovary. The males are retained in the ovary until sexually mature.



Body cavity of *Cymatogaster* aggregatus cut open to show fully formed youngs.

Advantages of parental care in Fishes

- Survival
- Protection
- Contribute to reproductive fitness
- Increased growth rate and quality
- Better development

CONCLUSION

In fishes conspicuous parental care is not observed, the eggs are laid sufficiently in safe places and over production of eggs compensates loss by destruction. In most cases it is the male who takes care of eggs, young ones and defend them.

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- Youtube Videos

Thank you...