PARENTAL CARE IN FISHES

Parental care, the investment in young after fertilization, may not be a behaviour that immediately jumps to your mind when you think of fishes. However, many fishes provide care for their young, and they care for the young in different ways. Which parent provides the care also varies greatly from fish species to fish species. The impressive variation in parental-care tactics has made fishes an excellent group for testing our understanding of how parental care evolves.

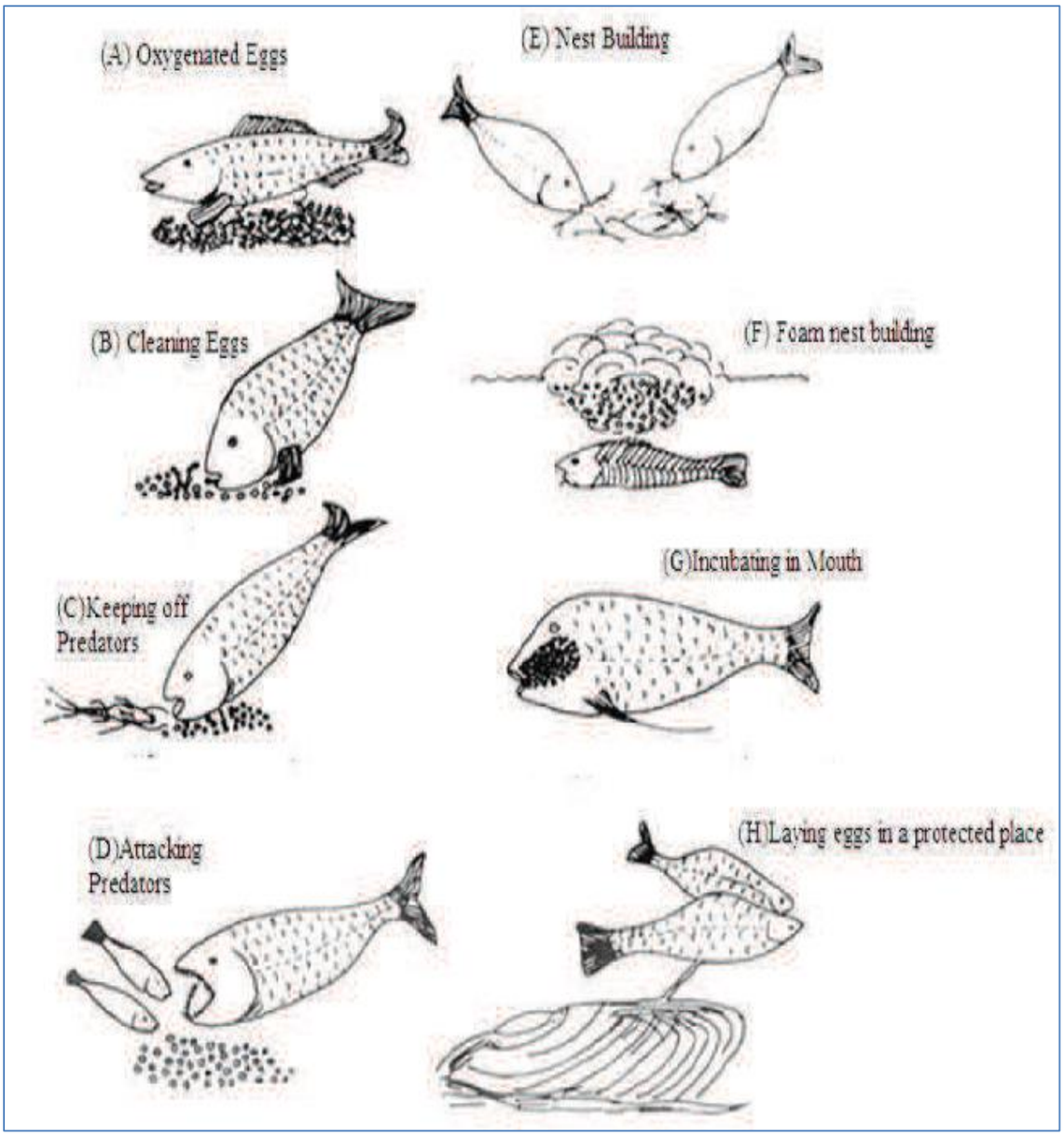


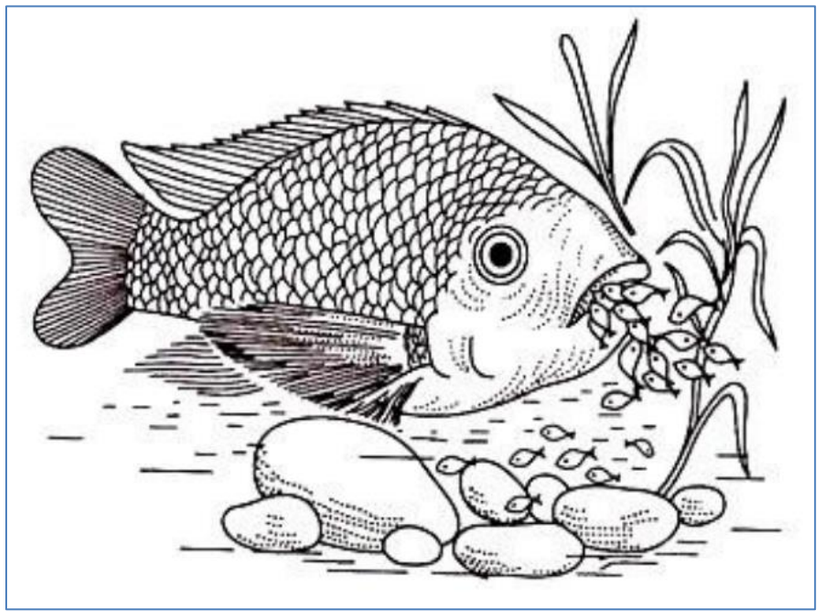
Fig: Parental care in fishes

Robert Trivers coined a more restrictive term 'parental investment' to refer to any action by parents that increases offspring fitness at a cost to parental fitness (because it curtails their ability to invest in future mating, fecundity, survival, or further parental care). The terms parental effort or parental expenditure refer specifically to the time and effort spent on parental care of offspring, again referring to actions that are thought to increase offspring fitness, for example, defending offspring against predators. This measure is related to parental investment but does not necessarily imply fitness costs for parents, as the costs of parental care may change with an individual's age, status, or condition.

- Looking after the eggs or young until they are independent to defend themselves from predators is known as parental care.
- Parental care behaviour is any behaviour performed after breeding by one or both parents, which 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 exceptions in which the eggs and young are guarded with great care 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.



In the above diagram Tilapia mossambica fish young ones take shelter into the mouth of the female fish whenever they sense any sort of danger. This is an example of parental care in fishes.

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.

Deposition 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.

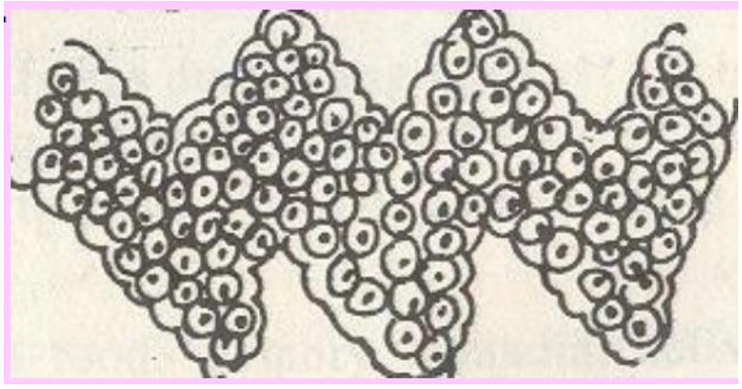


Fig: Deposition of eggs in masses.

Laying of eggs at suitable places:

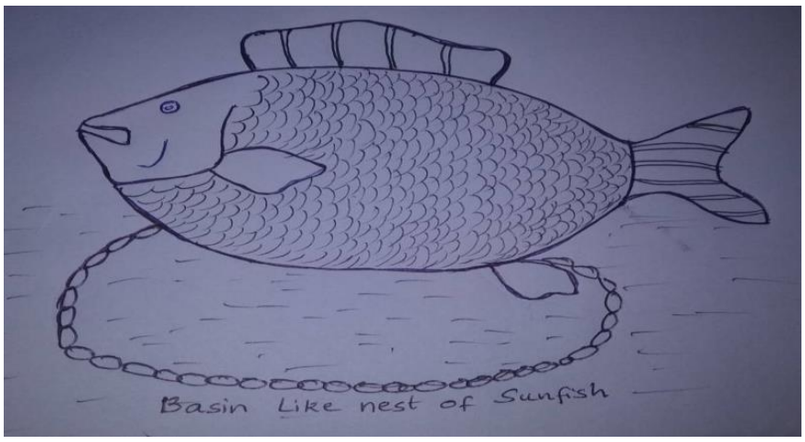
- *Salmo solar, Acipenser, Oncorhyncus* choose suitable place for spawning.
- They dig excavation in gravel substrate, lay eggs in the pits and cover them with gravels.

Nest building

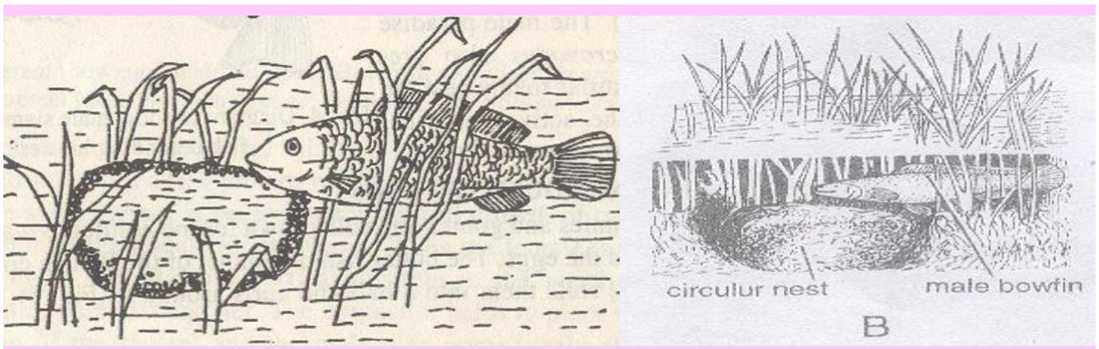
•The nest building provides suitable and safe place for the development of their young. Nests are bulit with various kinds of materials such as stones, aquatic vegetations ,secretion of their body etc.

•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.

- 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.



- 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 leave 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.

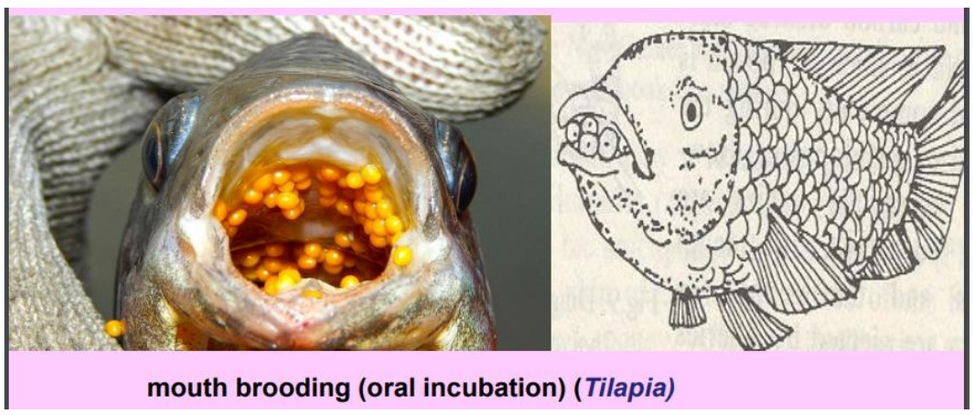
Fig. Barrel shaped nest

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

- 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.

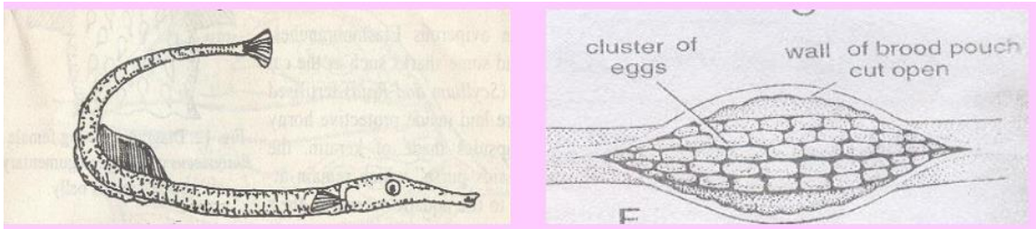
Male Siamese fighting fish defending his nest

- The 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.



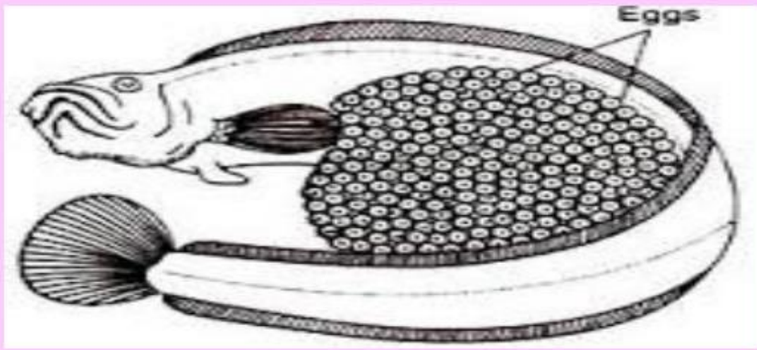
mouth brooding (oral incubation) (*Tilapia*)

- 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

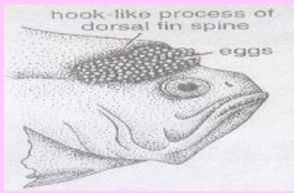
- The butter fish (*Pholis gunnellus*) rolls all eggs into a ball and curls around it. Very often it is done by male.



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

- The male nursery fish (*Kurtus*) of New Guinea, carries eggs held in cephalic hook. The clusters 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.



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 and some species like *Zoarces*, *Gambusia* and *Poicilia*, show internal fertilization.

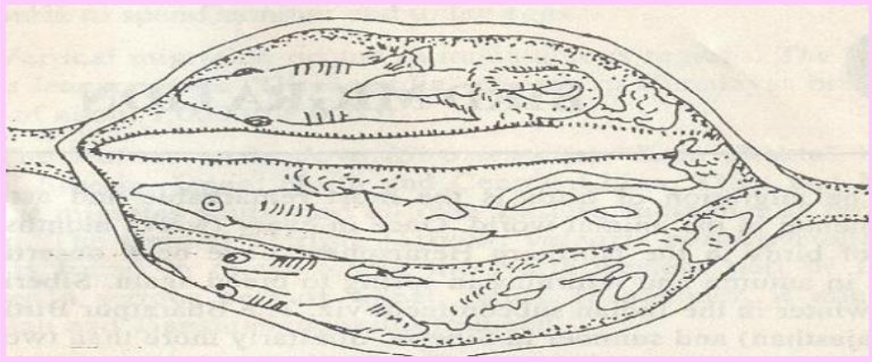
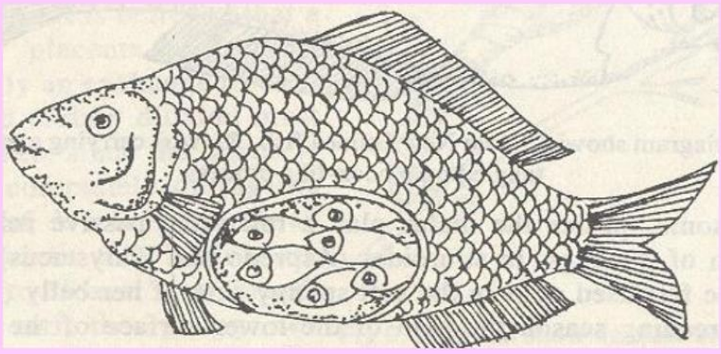


Diagram showing yolk-sac Placenta

- 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

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