

B.Sc ZOOLOGY (HONS)

DEGREE I

PAPER 2

PARENTAL CARE IN AMPHIBIA

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Parental care in Amphibia:

Struggle for existence and perpetuation of race are rules of nature. Perpetuation of race in the face of various adverse factors is possible by over production of eggs and/or parental care, i.e., caring of eggs by one or more parents. Parental care is an important phenomenon in the trend of evolution and is met with in different vertebrate groups. It is an instinct which has contributed much in the success of vertebrates. It was first manifested in a breathing Instinct or tendency for one or more parents to remain with the egg s. Among amphibian it seems to have independently developed and various degree of parental care can be observed in them. The various ways by which parental care is manifested among amphibians are as follows:

1. Position of eggs in suitable place and bodies.
2. Construction of nests.
3. Carrying of the eggs by parents.
4. Development of brood pouch.
5. Department in uterus.

DEPOSITION OF EGGS IN SUITABLE PLACE AND BROODING:

Eggs are generally laid in such a place where they can develop properly. For this the eggs are deposited in a hole on muddy bank of river for pond as in *Rhacophorous schlegli*. The eggs are then covered by foamy mucus, a dermal secretion, to prevent desiccation. In *Hylodes* the

eggs are deposited on the undersurface of leaves overhanging rivers and ponds. For security the eggs may be attached to aquatic weeds by glues as in ***Triton***. In hynobid salamanders the males remain with the eggs for varying period to fertilize them and exhibit an active interest in the eggs. The cryptobranchids guard the eggs until they hatch. Most amphibian which lay their eggs in the water abandon them after fertilization, but among those which deposit large yolked eggs, the female frequently remains with them. The primitive Plethodontid ***Gyrinophilus*** lay their eggs under stones in stream. In the terrestrial plethodontids the female takes up the eggs over the body to provide moisture and her dermal secretions prevent growth of mould over eggs.

CONSTRUCTION OF NESTS:

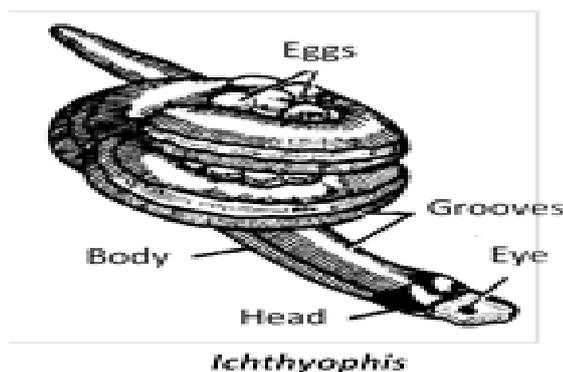
Many amphibians have been observed to construct nests of various types for protecting the eggs. ***Rhacophorus maculatus*** digs a hole just above the water level and fills it with froth and foam by the movement of hind limbs both by the male and female. The eggs are laid in the frothy mass where they are prevented from desiccation.

Hyla faber digs a basin shaped hole in shallow water and constructs a wall with surplus mud around the rim of the basin. A South American tree frog, ***Phyllomedusa***, builds a nest by folding the margin of leaves. Cloacal secretion is used for gluing the leaf margins. Shoots of trees are used for

making nest by **Triton** in which the eggs are deposited for further development. The mail hell blender **Cryptobranchus** builds nest on the river bottom and guards the nest until the eggs are hatched. In **Salamandrella** the eggs are deposited in a gelatinous bag which is fixed to some aquatic object below the level of water.

CARRYING OF THE EGGS BY PARENTS:

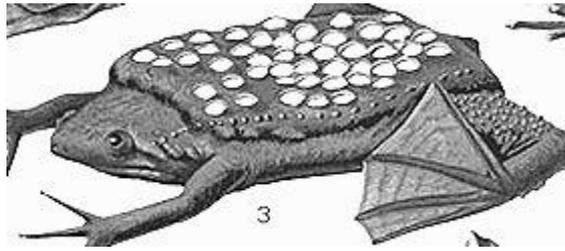
Some amphibians are found carrying their eggs on their body. Thus, the females of **Ichthyophis**, **Amphiuma** and **Siphonops** lay the eggs in damp places. The eggs are stringed together and the females coil round these egg masses guarding them until hatching. In **Alytes** the eggs are laid in two strings and become attached to the waist and hind limbs of males. The male toad then withdraws to some moist place along with the coiled egg mass. When the eggs are about to hatch, the male carries them to some pond for hatching. The larvae come out and metamorphose into adults.





ALYTES

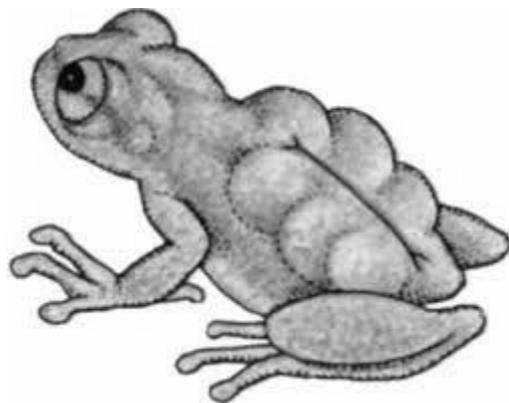
In *Hyla goeldii* a Brazilian species, the females carry the eggs on their back in incipient brood pouches. In *Desmognathus* the females carry the eggs clustered around her head and leaves in underground hole. In *Pipa dorsigera*, the back of the female is flattened and beset with dermal pockets for carrying the eggs. During breeding season, the male places the fertilized eggs on the back of the female which thickens around the deposited eggs forming pit into which the egg sinks. An Operculum covers the pit. The partition between the pits becomes richly vascularised and physiological exchange of materials occurs between the embryonic and maternal tissues. In *Pipa pipa*, the eggs are deposited in simple pits on the back of the female.



Pipa pipa

DEVELOPMENT OF BROOD POUCH:

In some amphibian species special pouches are developed for protecting eggs. In ***Gastrotheca marsupialia***, the female develops special brood pouch on her back for carrying the eggs. The pouch is closed on all sides except for a small slit like opening in the posterior side. The female ***Nototrema*** carries her eggs in a dorsal horse shoe shaped pouch which develops during the breeding season.



Gastrotheca marsupialia

In some species of *Rhinoderma* the males carry the eggs and tadpoles in special gular pouches which develop from vocal sacs. In *Arthroleptis* the larvae are kept inside the buccal cavity of the male at the time of danger

DEVELOPMENT IN UTERUS:

In *Geotryptes* the yolky eggs remain in the last part of the oviduct. The small embryos hatch and remain inside the oviducts till they grow in length to about 75 millimeter. The uterine milk provides nutrition to the developing embryo. The viviparous amphibians like *Salamandra atra* and *S. maculosa* exhibit further modification. Here the eggs are retained inside the uterine cavity. The larvae hatch out and become attached to the uterine wall by means of membrane which allows metabolic exchange of materials. The broad vascular tail also serves this function.

CONCLUSION:

The above account indicates the various degree of parental care exhibited by different amphibians. This instinct first manifests itself in simple brooding which affords protection to the eggs. The bond between parent and eggs gradually become stronger. However the brooding habit in some cases may have resulted merely from exhaustion of the female after laying eggs. The brooding instinct exhibited by some male maybe merely the tendency of the males to

remain near their calling station. But complex modifications in structure and behaviour are observed in amphibians in respect of this particular instinct. The play of the Instinct maybe influenced by hormonal actions or due to reflex action brought about during the breeding season. In fine, parental care has contributed much to success of amphibians in perpetuating the race against many organs in the new terrestrial environment.
