Dr. O. P. Singh,
Asst. Prof. Dept. of Zoology,
Y. D. PG College Lakhimpur

Parental Care in Amphibia

Looking after the eggs or young until they are independent, to defend from predators, is known as parental care. In amphibians there are many devices for the protection of the eggs during the early stages of development.

or

Parental care is the care of the eggs or the young until they become able to protect themselves from the predators.

The methods of caring by Amphibia generally fall under two broad categories:

(A) Protection by means of nests, nurseries, or shelters and

(B) Direct caring by parents.

The different modes of protection are given below in the three important orders of class Amphibia.

A- Protection by Means of Nests, Nurseries and Shelters:

Amphibians have evolved countless interesting methods to give protection to their defenceless eggs and larvae from predators. Different species of frogs and toads construct nests or shelters in which the eggs are deposited and the young are developed.

1. Selection of Site-

Many amphibians lay eggs in protected, moist microhabitats on land. Many tropical frogs and toads lay eggs on land near water. Many tree frogs lay their eggs not on land but on leaves and branches overhanging water. Species of Phyllomedusa, Rhacophorus etc glue their eggs to foliage hanging over water. Rhacophorus malabaricus in India and Chiromantis of Africa also deposit their spawn on trees. Many tree frogs deposit eggs in water that accumulate in epiphytic tropical plants. The tadpoles on hatching drop into water to complete their metamorphosis.

2. Defending Eggs or Territories- Males of green frog Rana clamitans and other species maintain territories and attack small intruders to defend eggs. In Mantophryne robusta, the male actually sits over and holds with hands the elastic gelatinous envelope containing eggs numbering 17. Some tree frogs laying eggs above water may sit beside the eggs are rest on top of them.

3. Direct Development- In some terrestrial or tree frogs such as Arthroleptis, Hylodes and Hyla nebulosa, the eggs hatch directly into little frogs thus avoiding larval mortality.

4. Foam Nests - Many amphibians convert copious mucus secretion into nests for their young. In the Japanese tree frog Rhacophorus schlegeli the mating couple digs a hole or tunnel into which eggs are left in a frothy mass to avoid desiccation. During rains, hatching tadpoles are washed down the sloping tunnel into pond or river water for further development. The female of South American tree frog Leptodactylus stirs up a frothy mass of mucus, fills in holes near water and lay eggs in them. Some anurans lay eggs nests of foam floating on water.

5. Mud Nests- In Brazilian tree frog Hyla fabre the male digs a little crater like hole or nursery in mud in shallow water, in which the female lays her eggs. The nest is 30 cm in diameter and 5 to 8 cm deep. Tadpoles hatch within this relatively safer barrier and develop until they are large enough to defend themselves.

6. Tree Nests- The South American tree frog Phyllomedusa hypochondrales lay eggs in a folded leaf nest with margins glued together by cloacal secretion. The tadpoles when formed fall straight into water below. Another tree frog Hyla resinfictrix, lines a shallow tree cavity with bees wax obtained from the hives of certain stingless bees. Female lay eggs when this cavity is filled with rainwater. Here the young develop relatively free from predators.

7. Gelatinous Bags – In Phrynixalus biroi large eggs are enclosed in a sausage-shaped transparent gelatinous membranous bag, secreted by female and left in mountain streams. Salamandrella keyserlingi also deposits 50 to 60 small eggs in a gelatinous bag which is fastened to aquatic plants.

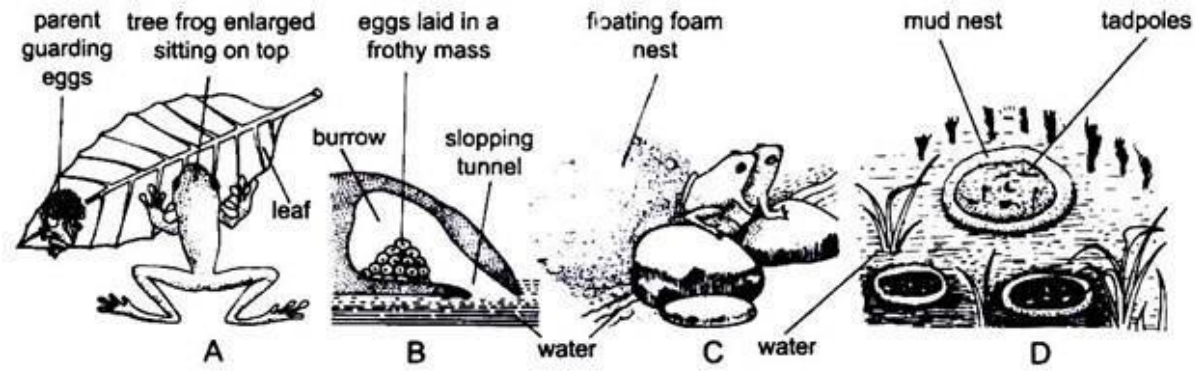

Fig. 20.1. Parental care in Amphibia. Protection by nests, nurseries or shelters. A–A tree frog guarding eggs glued to a leaf overhanging water; B–Foam nest of *Rhacophorus schlegeli* in a sloping burrow near water; C–Foam nest floating on water; D–Mud nest of *Hyla faber*.

(B) Direct caring by parents-

1. Coiling Around Eggs:

In Congo eel, Amphiuma (urodele) and certain caecilians like Ichthyophis and Hypogeophis the female large eggs in burrows in damp soil and carefully guards them by coiling her body around them until they hatch. The female Plethodon (Salamander) also coil round the eggs which are laid in small packages beneath the stones or in the hollow of rotten log. In Megalobatrachus maximus, (urodele) the male coils round the eggs.

2. Organs as Brooding Pouches-

In Rhinoderma darwini, (South American Darwin's frog) the eggs (few and large) are transferred by the male to the relatively large vocal sacs that extend over its ventral surface, where eggs develop. In Arthroleptis, it is the male frog who keeps the larvae in his mouth. Australian frog Rheobatrachus silus keeps the eggs in her stomach. The tadpoles are expelled through mouth after metamorphosis.

3. Tadpoles Transported from One Place to Another-

Small South American frogs Phyllobates and Dendrobates and tropical African frogs Arthroleptis and Pelobates lay their eggs on ground. The hatched tadpoles adhere by their sucker-like lips and flattened abdomen to the back of one of their parents and, thus, they are carried from one place to the other and in this way they can even go from one pool to the other and this is particularly when one pond is to dry up.

4. Eggs Carried by the Parents-

In Obstetric toad (Alytes obstetricans) of Europe, the male entangles the eggs by adhesion of their gelatinous secretion round his hindlegs. Here they are retained until the tadpoles are ready to be hatched. Female Rhacophorus reticulatus (Sri Lankan tree frog) carries the eggs glued to her belly. In Desmognathus fusca (urodele) the string of eggs is bound around the neck until they hatched.

5. Eggs in Back Pouches-

In one group of tree frogs called marsupial frogs or toads, the female carries the eggs on her back. In a Brazilian tree-frog, Hyla goeldii, the female carries the eggs on the back within an incipient brood pouch in which the eggs remain exposed. How they reached there is not known but probably male does it. In Nototrema also the eggs are placed over the back in a single large brood pouch covered by the skin and opened posteriorly in front of cloacal aperture. In Pipa americana (Surinam toad) the eggs are carried on the back of the mother. In breeding season the back skin of female becomes thick, vascular, soft and gelatinous. The male places and spaces the eggs. Each egg sinks into a small pouch, over which develops an operculum, which comes from a remnant of the egg envelope, reinforced by integumental secretions.

6. Viviparous or Viviparity-

Some anurans are ovoviviparous. They retain eggs in the oviducts and the females give birth to living young. Two small East African toads, Pseudophryne vivipara and Nectophryne tornieri, are known to be viviparous, but no observations have yet been made on them beyond the fact that larvae are found in the uteri. Caecilians like Typhlonectes, Geotrypetes, Schistometopum, Chthonerpeton, Gymnopis are ovoviviparous.

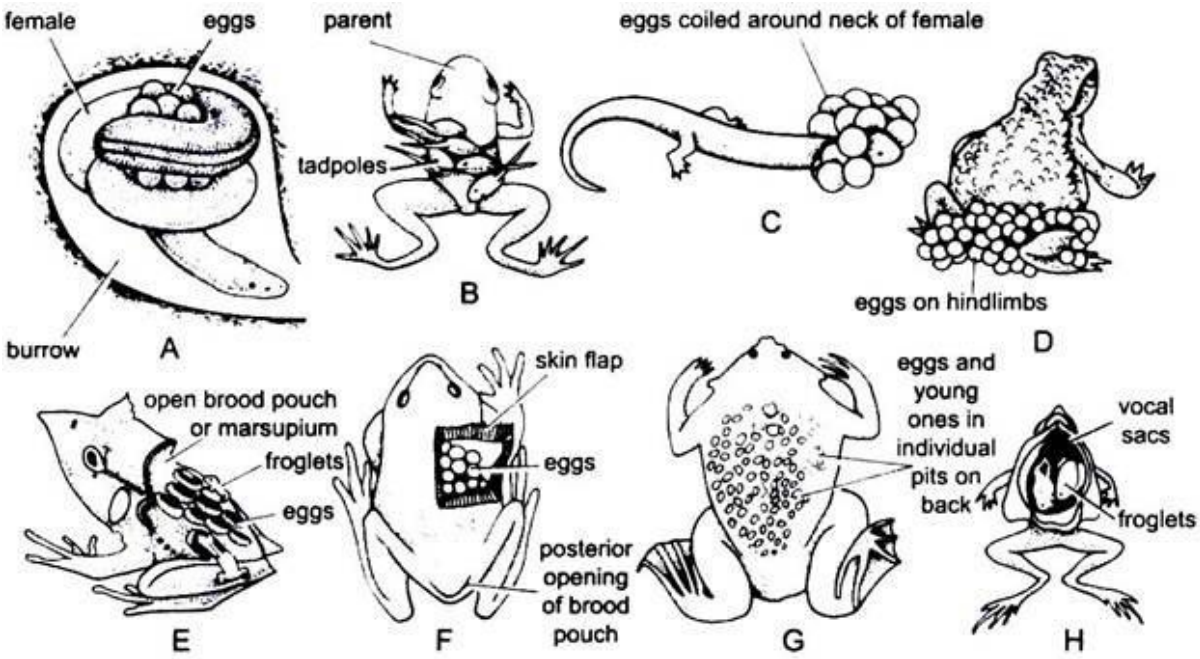

Fig. 20.2. Direct parental care in Amphibia. A–Female *Ichthyophis* coiling round eggs; B–Transportation of tadpoles attached to back of a parent; C–*Desmognathus fuscus* with eggs; D–*Alytes obstetricans* carrying eggs around his thighs; E–A marsupial frog with eggs exposed in open brood pouch on back; F–*Nototrema* or *Gastrotheca*, with flap of dorsal brood sac cut open to show eggs; G–In *Pipa*, eggs develop completely into individual capsules on back of female; H–Froglets inside vocal sacs cut open of female *Rhinoderma darwinii*.