

Parental Care in Amphibians

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Definition of parental care

Parental care may be defined as all activities that are directed by an animal towards the protection and maintenance of its own offspring or those of a near relative. It is the care of the eggs or the Youngs until they become able to protect themselves from the predators.

Parental Care in Amphibians

Parental care may be defined as any behavior exhibited by a parent toward its offspring that increases the offspring's chances of survival (Trivers, 1972); this investment may reduce the parent's ability to invest in additional offspring. In amphibians there are many ways for the protection of the eggs during the early stages of the development.

Among amphibians, parental care includes-

Attendance of the eggs, transportation of eggs or larvae, and feeding of larvae. Parental care is associated only with those species that place their eggs in single clusters, never with those that scatter their eggs in aquatic situations. Nest construction, either prior to or during opposition, is not considered to be parental care, although in some species that construct nests, one parent may attend the eggs. Likewise, the retention of eggs in the oviducts, even though nourishment is provided to the developing young, is not considered to be parental care.

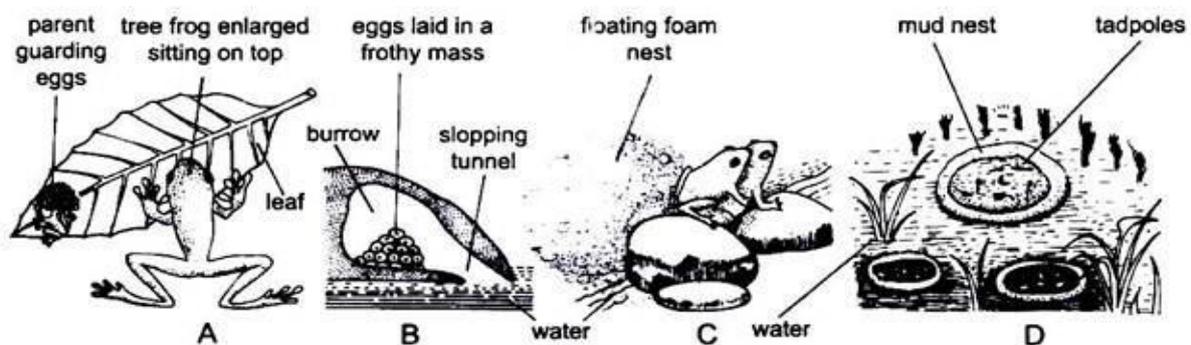


Fig. 20.1. Parental care in Amphibia. Protection by nests, nurseries or shelters. A—A tree frog guarding eggs glued to a leaf overhanging water; B—Foam nest of *Rhacophorus schlegeli* in a sloping burrow near water; C—Foam nest floating on water; D—Mud nest of *Hyla faber*.

There are various ways by which the parental care is shown in amphibians.

1. Selection of Site:

Some amphibians lay their eggs in safe and moist land, very near to water.

- *Rhacophorus schlegli* of Japan, lays eggs in a hole on muddy bank of river or pond with foamy mucus cover to prevent the eggs from drying.
- In *Gyrinophilus* the eggs are laid under the stones in stream. Sometimes, the eggs are taken up on the body.
- In case of *Hylodes*, eggs are laid on the under surface of leaves hanging above water.
- In *Triton* the eggs may be fixed with the aquatic weeds by glues.

2. Frothing of Water:

In *Rhacophorus maculates*, after the eggs are laid, surrounding water is made frothy by the limb movements, which prevent the eggs from desiccation and escaping from the eyes of the predators.

3. Defending Eggs:

- Males of green frog *Rana clamitans* defend their eggs by not allowing small sized intruders in their territories.
- Males of *Mantophryne robusta* holds with hands cluster of eggs in gelatinous envelop.

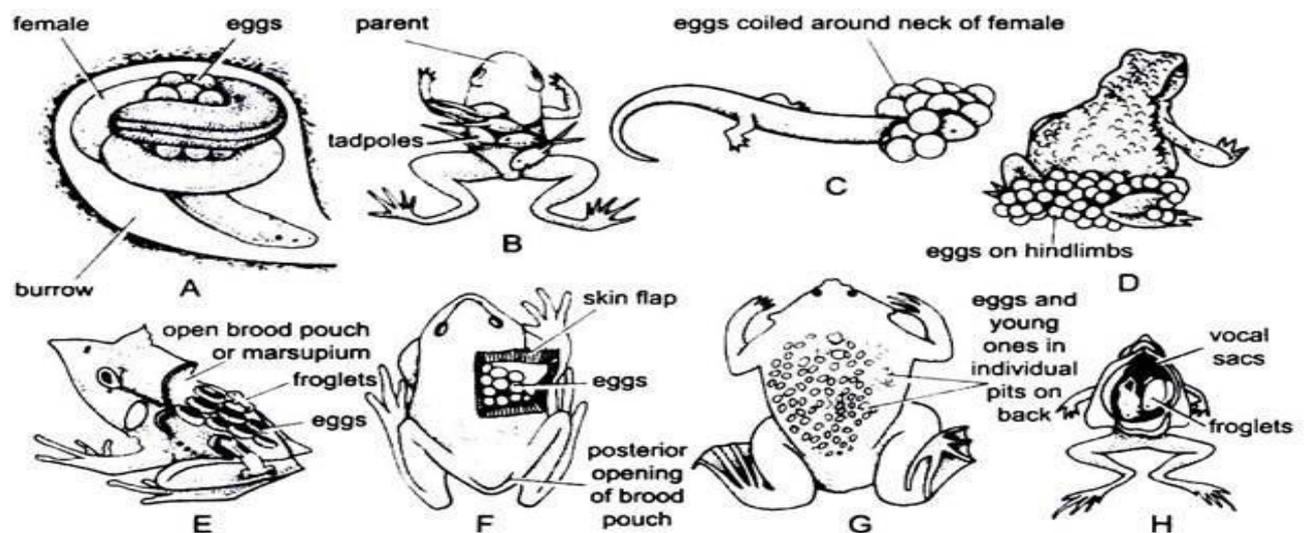


Fig. 20.2. Direct parental care in Amphibia. A–Female *Ichthyophis* coiling round eggs; B–Transportation of tadpoles attached to back of a parent; C–*Desmognathus fuscus* with eggs; D–*Alytes obstetricans* carrying eggs around his thighs; E–A marsupial frog with eggs exposed in open brood pouch on back; 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*.

4. Formation of Nests:

Some amphibians build nests for deposition of eggs.

- **Mud Nest:** *Hyla faber* digs small holes in the mud for deposition and development of the eggs.
- **Leaf Nest:** In a South American tree frog *Phyllomedusa hypochondriale*, margin of the leaves are folded and glued together which acts as nest for the eggs.
- **Shoot Nest:** *Triton* construct the nest by fixing the shoots with a gelatinous secretion.

5. Direct development:

Some terrestrial or tree frogs, like *Hylodes* and *Hyla nebulosi*, the eggs hatch directly into tiny juveniles avoiding predator attack and larval mortality.

6. Carrying eggs over the body

i) Coiling around eggs:

- *Amphiuma*, *Ichthyophis* females after laying eggs guard them by coiling body till the eggs hatch.
- In *Megalobatrachus*, the males perform the same function.

ii) Transferring tadpoles to water:

Phrynobates, *Pelobates* species inhabiting tropical Africa and South America hold the newly hatched tadpoles with their mouth and transport them to water.

iv) Eggs glued to the body:

- Salamander *Desmognathus fuscus* females carry cluster of eggs glued to their body.
- In Sri Lankan tree frog, *Rhacophorus reticulatus*, the eggs are glued to the belly of the females.
- In a European frog, *Alytes obstetricans*, instead of female's parental care, the male entangles the eggs around his hind legs.

iv) Eggs in back pouches:

- In *Hyla goeldii*, the females carry the eggs on their back.
- In *Desmognathus*, the females carry the eggs and live in underground hole.
- In *Pipa pipa*, the eggs are carried by females on the back.
- In *Cryptobatrachus evansi* the dorsal skin contains many small pockets for lodging of eggs.
- In *Pipa dorsigera*, the eggs are developed in the pits on the back of the females. During breeding season, the dorsal skin becomes soft, spongy, and vascular.

Embryonic development occurs within the pits and physiological exchanges takes place between the females and the larva.

7. Carrying eggs over the body:

In *Arthroleptis*, the larvae are attached to the males and are carried from one water body to other.

8. Organs as brooding pouches:

- South American male frog of *Rhinoderma darwinii* keeps fertilized eggs in his vocal sacs where they undergo complete development.
- In *Hylambates breviceps*, the female carries eggs in her buccal cavity.

9. Vivi parity:

A special type of reproductive behavior is observed in *Salamandra atra* and *S. maculosa*. The eggs are placed inside the uterine cavity where the entire development takes place. The uterine wall functions physiologically as primitive placenta.