

## **B.Sc (Honours) Second year**

Paper-3

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### **Classification and General Characteristics of Class Amphibians**

1. They are the first cold blooded vertebrates from evolution point of view which came to the land. Class Amphibian includes about 3,000 species.

They are amphibious in nature, viz. they can live on land as well as in water. They are mostly found in warm countries. They are ectothermic (cold blooded).

3. Body is divisible into head and trunk. Tail may be present in some amphibians.

4. The skin is smooth or rough having glands which keep it moist.

5. They are usually without scales, but if present they are hidden beneath the skin (e.g caecilians).

6. Paired fins are absent. Unpaired fins may be present. Two pairs of limbs are used for locomotion except caecilians.

7. The gills are present at least in the larval stage; some adult forms also carry external gills in addition to lungs (e.g., Necturus, Proteus).

8. Skull is dicondylic, i.e., with two occipital condyles for articulation with vertebral column.

9. The respiratory organs are lungs, buccopharyngeal cavity, skin and gills.

10. The heart is three chambered, having two auricles and one ventricle. In the heart, there are present sinus venosus and truncus arteriosus. Both hepatic portal and renal portal systems are well developed. RBCs are biconvex, oval and nucleated.

11. Kidneys are mesonephric. Urinary bladder is present in frog. Larvae and tailed amphibians (e.g., salamanders) are ammonotelic. Frogs and toads are ureotelic.

12. Alimentary canal, urinary and reproductive tracts open into a common chamber called cloaca which opens outside through cloacal aperture.

13. Ear consists of internal and middle ear. Tympanum (outer membrane) covers the middle ear. The eyes have eyelids. Nictitating membrane is well developed.

14. Ten pairs of cranial nerves are present.

15. Lateral line system is found during their development.

16. Fertilisation is external. However in Salamander and Ichthyophis (blind worm) fertilisation is internal. They are mostly oviparous; however, Salamandra is viviparous. Development is mostly indirect.

17. They return to water for breeding. Male lacks copulatory organs. The metamorphosis is usually present. A fish like larva, the tadpole is present.

18. They occur in fresh water and moist land. Amphibians are not found in sea water except a few.

### **Classifications of Living Amphibians:**

**Living Amphibians are divided into three orders:**

#### **Order 1. Apoda (Gymnophiona or Caecilia):**

Limbless, scales present, e.g., Uraeotyphlus, Ichthyophis. They are called “blind worms” or caecilians.

#### **Order 2. Urodela (Caudata):**

Tail present, e.g., Necturus (Mud puppy), Amphiuma (Congo-eel), Salamandra, Proteus, Siren (Mud-eel), Ambystoma, Triturus (newt), Tylototriton (crocodile newt).

#### **Order 3:**

Anura (Salientia). Without tail, e.g., Rana (Common frog), Rhacophorus, Bufo, Hyla, Alytes, Xenopus (African toad), Pipa.

**Ichthyophis (Blind Worm):** It is limbless. Dermal scales are embedded in the skin. Male copulates with female by a protrusible cloaca and thus fertilization is internal. The female shows parental care by carefully coiling her body around the eggs till they hatch.

#### **Necturus — Mud Puppy, Water Dog:**

Eyes are without eye-lids. Tympanum is absent. There are three pairs of external gills. Tail bears caudal fin which is without fin rays. It is nocturnal.

**Axolotl:**

The larva of *Ambystoma* (tiger salamander) is known as Axolotl. It has three pairs of external gills and a tail having a caudal fin. It exhibits the phenomenon of neoteny. When there is iodine deficiency in water, the Axolotl does not change into an adult, but remains in the larval form and becomes sexually mature to start sexual reproduction. Axolotl is found in mountain regions of Mexico.

**Proteus (European Blind Cave Salamander):**

The broad head has rudimentary eyes, so that it is blind. Three pairs of external gills, laterally flattened tail with a caudal fin and weak fore and hind limbs are present. Forelimbs have three digits and hind limbs have two digits. Hind limbs are smaller than the fore limbs.

**Salamandra (Salamander):**

*Salamandra* (European spotted or fire salamander). The male discharges sperms in capsule called spermatophore which is picked up by the female with cloacal lip to fertilize her eggs (ova) internally. It is viviparous. Gills are absent in the adults. The trunk bears fore and hind limbs with four fingers and five toes respectively.

**Triturus Verrucosus (formerly described as Tylotriton Verrucosus):**

It is also called Himalayan newt because it lives in the Eastern Himalayas. In India, it is found in the Darjeeling Hills, Meghalaya, Sikkim, Manipur and Arunachal Pradesh. Head is with rounded snout and a pair of parotoid glands. Arms and legs are equal in size. It is nocturnal, carnivorous and possesses very good power of regeneration. It hibernates in winter.

**Pipa (The Surinam Toad):**

It is famous for the unique method of parental care. The female Surinam toad carries the tadpoles in special pits on its back till tadpoles become toads.

**Alytes (The Mid-Wife Toad):**

Male shows parental care. The male mid-wife toad carries the eggs around his thighs and stays in damp places until tadpoles hatch to enter water.

**Hyla Arborea (Tree Frog):**

It is adapted for life in trees. Large vocal sacs help in making a very loud voice. *Hyla faber* shows parental care by making enclosures in shallows water on the border of the pond for protection.

**Rhacophorus (Flying Frog):**

The limbs are thin and long with well developed webs between the digits. It lives in trees and glides from tree to tree or from tree to the ground. It also exhibits parental care by depositing eggs in the nest near water.

**Bufo Melanostictus (Indian Toad):**

It inhabits on land in moist and dark shady places, such as the corners of gardens and under the leaves and stones, etc. It is a terrestrial and nocturnal animal.

The secretion of its skin glands contains bufonin and bufotalin, which probably have healing property. For breeding it goes to water where it lays eggs in strings. Since it bears poisonous glands (parotoid glands), it is not generally eaten by other animals like snakes, birds, etc.