Amphibia Classification

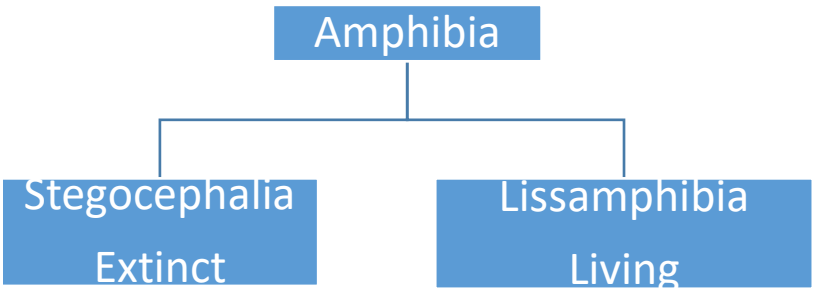
Transition from aquatic to terrestrial mode of life was the greatest event in the phylogenetic history of chordate and Amphibians were the first to invade the land. Amphibians are neither terrestrial nor aquatic instead they are adapted for both types of environments. The term Amphibia, itself, indicates dual mode of life. Hence, Amphibia are between fish (aquatic) and reptile (terrestrial). About 2500 living amphibian species are present today.

Important Characters

1) Poikilothermic, carnivorous, oviparous, aquatic or semiaquatic (freshwater)
2) Limbs 2 pairs, some limbless,
3) Paired fins absent, median fins, if present, devoid of fin rays
4) Chromatophores and glands present in skin
5) Exoskeleton absent, some with concealed dermal scales
6) Endoskeleton mostly bony, skull dicondylic
7) Cloaca present
8) Teeth homodont, protrusible tongue
9) Larva with external gills
10) Heart 3-chambered, aortic arches 1-3 pairs
11) Erythrocyte large, nucleated, and oval
12) Kidneys mesonephric, ureotelic
13) Cranial nerves 10 pairs
14) Aquatic adults with lateral line system
15) Middle ear with single rod-like one called columella
16) Males devoid of copulatory organ
17) Development indirect, larva tadpole, cleavage holoblastic unequal

CLASSIFICATION

Following classification is based mainly on the classification provided by G. Kingsley Noble (1924).



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Subclass I. Stegocephalia (Extinct)

1) Limbs pentadactyle
2) Skin provided with scales and bony plates
3) Skull with solid bony roof
4) Permian to Triassic

Order 1. Labyrinthodontia

1) Oldest known tetrapod, also known as **stem amphibia**
2) Freshwater or terrestrial
3) Salamander or crocodile like
4) Teeth large with much folded dentine
5) Carboniferous to Triassic

   Example *Eryops*

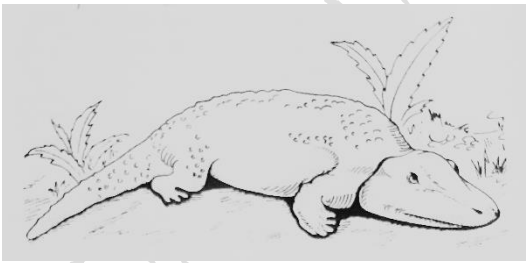


Figure 1 Eryops

Order 2 Phyllospondyli

1) Head large, flat
2) Vertebrae tubular
3) Notochord and spinal cord in common cavity
4) Gave rise to Salientia and Urodela
5) Carboniferous to Permian

   Example *Branchiosaurus (Ichthyostega)*

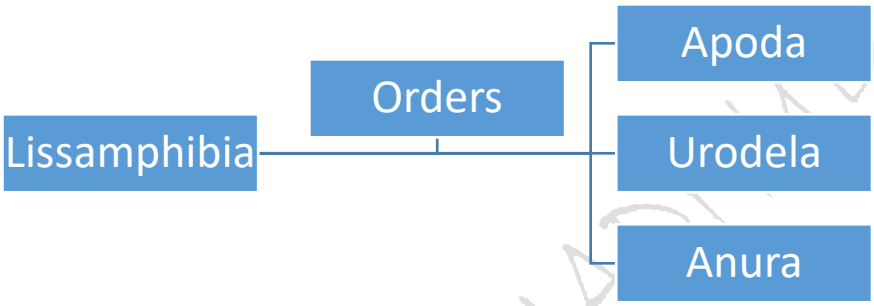
Order 3. Lepospondyli

1) Vertebrae cylindrical, each made up of single piece
2) Neural arch and centrum continuous
3) Ribs articulate intervertebrally
4) Ancestor to Gymnophiona
5) Carboniferous to Permian

   Example. *Diplocaulus, Lysorophus*

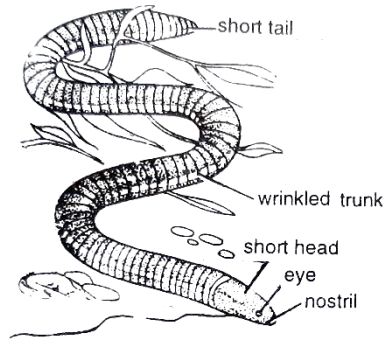
Subclass II Lissamphibia (living)

1) Modern amphibia
2) Lack dermal bony skeleton
3) Teeth small simple



Order 1. Gymnophiona or Apoda

1) Limbless, blind, elongated worm like
2) Burrowing tropical generally called caecilians
3) Limb girdles absent
4) Some have dermal scales embedded in skin
5) Males have protrusible copulatory organ
6) About 55 species
   Example. Ichthyophis, Uroaeotyphlus



Ichthyophis

Order 2. Uropoda or Caudata

1) Lizard-like with a clear tail
2) Skin devoid of scales
3) Tympanum absent
4) Gills permanent or lost in adult
5) Males have no copulatory organ
6) Larvae aquatic, adult-like, with teeth

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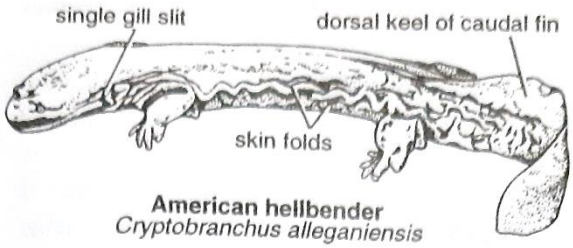
Suborder 1. Cryptobranchoidea

1) Most primitive, aquatic
2) Adults have no eyelids and gills
3) Premaxillary spine short
4) Angular and prearticular separate
5) Fertilization external

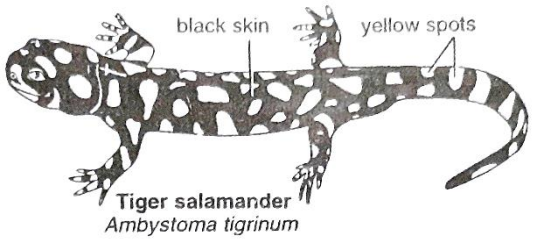
Example. *Cryptoranchus, Megalobranchus*



Suborder 2. Ambystomatoidea

1) Adults terrestrial, eyelids present
2) Angular fused with prearticular
3) Premaxillary spine large
4) Vertebrae amphicoelous
5) Fertilization internal

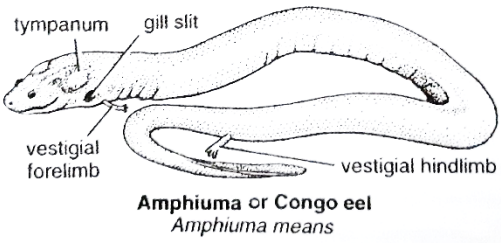
Example. *Ambystoma*



Suborder 3. Slalmandroidea

1) Vertebrae opisthocoelous
2) Three sets of cloacal glands
3) Teeth on prevomar and palate
4) Fertilization internal

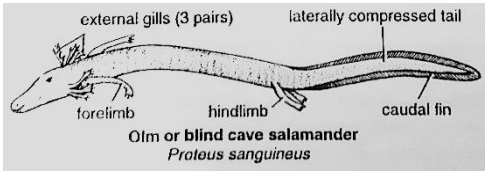
Example. Triton and Triturus (newts), *Salamandra* (salamander), *Amphiuma* (congo eel)



Suborder 4. Proteida

1) Aquatic ottom dwellers
2) Permanent larval forms
3) No eyelids
4) Adults have 3 pairs of external gills and 2 pairs of gill-slits
5) Skull cartilaginous
6) No maxillae
7) Jaws have teeth

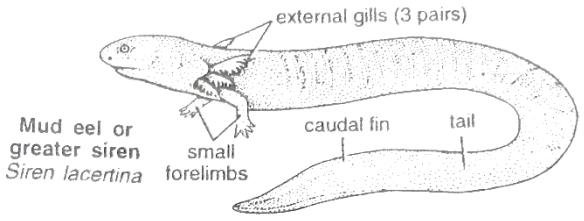
Examples. *Proteus* (olm), *Necturus* (mud-puppy)



Suborder 5. Meantes

1) Aquatic permanent larval forms
2) Forelimbs small, hind limbs asent
3) 3 pairs of external gills
4) No eyelids, no cloacal glands
5) Jaws with horny coverings

Examples. Siren (mud-eel), Pseudobranchus



Order 3. Anura or Sakientia

1) Specialized Amphibia
2) Tail asent in adults
3) Hind limbs adapted for leaping and swimming
4) Adults have no gills or gill openings
5) Tympanum present
6) Eyelids well formed
7) Skin scaleless, loosely fitting
8) Mandibles toothless
9) Vertebral column small made up of 5-9 presacral vertebrae and a slender urostyle
10) Fertilization always external
11) No neoteny
12) Complete metamorphosis
13) About 2200 species of frogs and toads
14) It has 5 suorders

Suborder 1. Amphicoela

1) Vetrebrae amphicoelous
2) Number of presacral vertebrae 9
3) Ribs free
4) 2 relict tail muscles
5) Fertilization internal

Examples. *Leopelma, Ascaphus*

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Suborder 2. Opisthocoela

1) Vertebrae opistholoelous
2) Scapula small
3) Ribs free in adult or larva

   Examples. *Alytes* (mid-wife toad), *Pipa, Xenopus, Discoglossus*

Suborder 3. Anomocoela

1) Vertebrae procoelous or amphicoelous
2) Free ossified ribs absent
3) Upper jaw with teeth

   Example. *Scaphiopus*

Suborder 4. Procoela

1) Vertebrae procoelous
2) Presacral 5-8
3) Urostyle with 2 condyles
4) No free ribs

   Examoles. *Bufo* (common toad), *Hyla* (tree toad), *Gastrotheca* (marsupial frog), *Dendrobates*

Suborder 5. Diplasiocoela

1) First 7 vertebrae procoelous
2) 8^{th} vertebra amphicoelous
3) Sacral or 9^{th} vertebra convex anteriorly and has 2 condyles posteriorly
4) Pectoral girdle fused to sternum (fermisternum)
5) Ribs absent

   Examples. *Rana* (common frog), *Polypedates* or *Rhacophorus* (tree frog)

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