SCIENCE

VERTEBRATA

Vertebrata are grouped into five classes :

1. Pisces 2. Amphibia 3. Reptilia 4. Aves 5. Mammalia

1. CLASS PISCES

General Characters:

- (i) True fishes are included in the class.
- (ii) They respire through gills.
- (iii) Stream lined body covered with scales / plates.
- (iv) They have muscular tail and fins for movement.
- (v) Endo skeleton is either made up to cartilage or bone.
- (vi) They are unisexual and lay eggs.
- (vii) Heart is 2 chambered.
- (viii) Cold-blooded vertebrates with true jaws.
- Fishes are of two types based on the nature of their endoskeleton.
 - A. Cartilaginous B. Bony fishes

A. Chondrichthyes (cartilaginous fishes)

- They are mostly marine, and generally large in size (upto 10-20 meters long).
- Skin is covered with placoid scales.
- Skeleton is completely cartilaginous.
- Respiration is through gills.
- Air bladder is absent.

Example : - Torpedo (electric ray), Scoliodon (dog fish), Trygon (sting ray).

B. Osteichthyes (bony fishes)

- Bony fishes are found in fresh water as well as in sea water.
- Fishes with endoskeleton consisting of bone.
- Air bladder is present, it helps in maintaining buoyancy.

Example: Labeo rohita (Rohu), Catla catla (Katla), Gambusia (mosquito fish), Exocoetus (flying fish), Hippocampus (sea horse), Anabas (Climbing perch), Protopterus (lung fish).



Knowledge Enhancer

- Animals, in which the body temperature varies according to surrounding environment are called cold blooded or poikilothermal animals. Example Invertebrates, Pisces, Amphibia and Reptilia.
- Animals, in which the body temperature remains constant and does not change with the change of environmental temperature are called warm blooded or homoiothermal animals.
 Example: Birds and Mammals.
- Gambusia eats on the larvae of mosquito. It is used to control mosquitoes.

CLASS XI

- Bony fishes are the most successful of the vertebrates, accounting for more than half of all living vertebrate species.
- In Hippocampus, male bears a brood pouch in which the female lays eggs.
- Flying fish does not fly but glide.

2. CLASS AMPHIBIA (Amphi = two or both ; bios = life)

- They live in fresh water and moist places.
- There are mostly two pairs of **pentadactyl (five digits)** limbs, which may be absent in some cases.
- Respiration is by **gills**, **lungs or skin**.
- Skin is smooth and without scales.
- Heart is **three** chambered.
- External ear absent (but ear drum present).
- Excrete either ammonia (by tadpole) or urea (by adults).
- Fertilization is external.
- Development is indirect with a tadpole larva which undergoes metamorphosis to become adult.

Example: Salamandra (salamander), Rana (frog), Bufo (toad), Hyla (tree frog), Necturus (mud puppy).



Knowledge Enhancer

• Most of the amphibians undergo hibernation (winter sleep) and aestivation (summer sleep) to overcome the unfavourable condition.

CLASS XI

- Limbless amphibian Ichthyophis.
- Tadpole is the larva of frog.
- Frog is active in day whereas toad is active at night.
- Skin of frog is moist and smooth whereas skin of toad is dry and rough.
- Frog has webbed feet whereas in toads it is absent.

3. CLASS REPTILIA : The creeping vertebrates. (Reptare - to creep).

- They are mostly terrestrial and live in warmer regions.
- Body is covered with epidermal horny scales.
- Respiration is by lungs only.
- Reptilia is the first class of terrestrial animals.
- Skin in dry, rough and without glands.
- They bear two pairs of **pentadactyl (five digit) limbs**, which are absent in snakes and some lizards.
- Heart is generally 3-chambered. In crocodile heart is 4 chambered.

Example : Chelone – marine turtles, Hemidactylus – Common lizard or wall lizard, Python – Azgar (largest snake), Naja – Indian Cobra, Naja bungarus – King cobra, Vipera – Viper snake, Crocodilus – Crocodile (Muggar)



Difference between Amphibia and Reptilia						
Characteristics	Amphibia	Reptilia				
Skin	It is glandular smooth and moist.	Skin is non-glandular, dry and keratirised.				
Scales	They are absent.	Scales are present over the body.				
Heart	It is three chambered.	Heart is incompletely four chambered.				
Fertilization	It is external.	Fertilization is internal.				
Egg.	They have a soft covering.	They have a hard covering or shell.				
Examples	Frog, Toad.	Lizards, Snakes, Tortoise.				

Knowledge Enhancer

- Reptiles are successful on land because of
 - (a) Internal fertilization (b) Shell around egg (c) Dry, scaly skin
 - (d) Amnion (embryonic membrane) encloses the embryo and provides it with a watery

environment during development. So, embryo does not need water for development.

4. CLASS AVES : The birds (Aves = Bird)

- Body is covered with feathers.
- Mouth is surrounded by a beak modified for different purposes.
- **Respiration** is by **lungs** only.
- First group of flying animals, having exoskeleton of feathers.
- warm blooded animals.
- Forelimbs are modified into wings while hindlimbs have four clawed digits.
- Pneumatic bones : The bones have air cavities. This makes birds light.
- Teeth are absent.
- Four chambered heart

Example: Struthio (Ostrich – largest flightless bird), Pavo (Peacock – National bird of India), Columba (Pigeon), Passer (Sparrow), Budo (Owl) etc.



5. CLASS MAMMALIA (Mamma = Breast)



- They are primarily terrestrial and occupying all sorts of habitats.
- Body is of varied shape, covered with hairs.
- They have two pairs of pentadactyl limbs modified for various purposes.
- Respiration is by lung only.
- Heart is 4–chambered.
- They are named mammals as all of them possess mammary glands (milk producing glands).Mammals are the only animals which feed their young ones with milk.

- The body cavity is unequally divided into two parts by a muscular partition called as diaphragm.
- Ears have fleshy external ears or pinnae.
- Non-nucleated red blood corpuscles are present in blood.
- Mammals are warm-blooded animals.
- Sexes are separate, internal fertilization is present.
- Mostly viviporous but a few are oviparous and lay eggs (e.g. Platypus & Echidna), and some like Kangaroos give birth to very poorly developed young ones.

Example: Macropus (Kangaroo), Rattus (rat), Canis (dog), Felis (cat), Panthera (lion, tiger, leopard) Homo sapiens (man), Platypus, Balaenoptera (whale), Elephas (elephant), Macaca (rhesus monkey), Pan (chimpanzee).

Characteristics	Aves	Mammalia			
Wings	Forelimbs are modified into	Wings are absent except in			
	wings.	bats.			
Feathers and	The body is covered with	Feathers and scales are absent.			
Scales	feathers and scales.				
Skin Glands	Skin is dry. Only a single	Skin bears a number of sweet			
	preen gland (oil gland).	and oil glands.			
Mammary Gland	They are absent.	Female possesses mammary			
		glands for feeding the young			
		ones.			
Beak	A toothless beak is present.	Jaws do not form a beak. Teeth			
		are present.			
Bones	They are hollow or pneumatic.	Bones do not possess air			
		cavities.			
Larynx/Syrinx	Larynx is non-functional.	Larynx is functional. Syrinx is			
	Instead syrinx is present.	absent.			
Air Sacs	Lungs possess external air	External air sacs do not occur			
	sacs.	over lungs.			

Difference between Aves and Mammalia

	Pisces	Amphibia	Reptilia	Aves	Mammalia
Habitat	Aquatic	Both land and water	Some terrestrial, others aquatic	Terrestrial (aerial)	Usually terrestrial, few aquatic.
Skin	Covered with scales/plates	Smooth skin with mucus glands and lacking scales	Water-proof skin with scales	Mostly covered with feathers	Covered with hair and contains sweat and oil glands.
Control of body temperature	Cold-blooded	Cold-blooded	Cold-blooded	Warm-blooded	Warm-blooded
No. of heart chambers	2	3	3(except crocodiles)	4	4
Respiration	Gills	Gills, lungs or skin	Lungs	Lungs	Lungs
Mode of reproduction	Oviparous	Oviparous	Oviparous	Oviparous	Viviparous
Locomotion	Tail and fins	Limbs	Limbs	Wings	Limbs
Examples	Rohu, shark, sea-horse, sting ray	Frog, salamander, toad	Crocodile, snake, turtle, lizard	Pigeon, ostrich, hen, duck	Human, whale, bat, lion