

Animal Kingdom.

- Animal kingdoms are characterised by heterotrophic Eukaryotic organism. That are multicellular and their cell don't have cell wall.
- Animals are found in almost all area on earth with their habitat from poles to equators.

→ Different habitat of animals are:-

Aquatic :- Those who leaves in water (Marine as well as fresh water both).

Marine :- Those who leaves in ocean or any other water that have more salt concentration.

Fresh Water :- Organism who leaves in river, ponds and lakes etc.

Terrestrial :- Those who leaves on earth surface.

Arboreal :- Those who leaves on tree
Ex:- Parrot (all birds), snakes.

Aerial :- Those who fly in air.

- Animals group are characterized by mobility at the presence of a sensory or a nervous system.
- These System animal receives Stimulate for the environment and animal responding by a behaviour.
- In this involvement porifera is the exception. That have expon sponges since their cells are not arranged properly show they don't have nerve cell
Ex:- Sponges.
- Some of the organism that can float on sea surface that is called Benthonic
Ex:- Corals, deep ocean fish, Echinoderms.
- Some of the animals who can swimming actively in sea is called nektons.
Ex:- Whales, Dolphins, Sharks.
- Some of the multicellular eukaryotic organism having holozoic mode of nutrition is called metazoans.
- On the basis of complex complicity of organisms metazoans are divided into two some kingdom -
 - (1) Parazoa
 - (2) Eumetazoa

* Parazoa:-

Organism in which their cell arrangements are loosely oriented and do not form tissue is called Parazoa.

Ex:- Spongy.

* Eumetazoa:-

The organism in which cells are organised into structural and functional units is called tissue and further develop into organ and then organ system.

* Eukaryotic organism having classified on the basis of :-

- (i) Level of organisation.
- (ii) Pattern of Digestive, circulatory and Reproductive system.
- (iii) Body Symmetry.
- (iv) Number of germ layer during embryonic development.
- (v) Nature of Cœlom or body cavity.
- (vi) Present or absent of Segmentation in body
- (vii) Present or absent of notochord.

* Level of organisation

There are four different levels of organisation

(i) Cellular level organisation.

Ex:- Porifera.

(ii) Tissue level organisation.

Ex:- Coelenterata, Ctenophora.

(iii) Organ level organisation

Ex:- Platyhelminthes.

(iv) Organ system level of organisation.

Ex:- Aschelminthes, mytilids or annelida
Arthropoda, mollusca, Echinodermata.

* Symmetry of body:-

Animals can be classified on the basis of their symmetry but the animals are differentiated on the basis of body symmetry.

① Axial / Axis symmetry :-

It is an imaginary line, passes through centre of body.

Ex:- longitudinal axis, transverse axis

LONGITUDINAL

TRANSVERSE

* Plane :-

- A flat surface which divide the body into corresponding half that is longitudinal plane or transverse plane.
- Longitudinal plane divide the body into Right and Left or front and back half. While transverse plane divide upper and lower.

* Type of body symmetry :-

- * Asymmetric :- When any plane passing through the centre and does not divide the body into equal half.

Ex :- Sponges (Porifera)

- * Radial symmetric :- When any plane passes through the central axis of body and divide the animal into two identical half.

Ex:- Some of the sponges, Ctenophora, Echinodermata.

- * Bilateral symmetric :- When the body can be divided into equal left and right half in one plane only

→ first phylum of Animal kingdom that shows bilateral symmetry is Platyhelminthes.

→ It is the characteristic of the most successful and higher animals including Platyhelminthes, Aschelminthes, Annelids, Arthropoda, mollusca, Hemichordata and chordata.

* Germ layer :-

On the basis of level of Germ layer animal having three type :-

- (i) Diploblastic :- In diploblastic only two layer of germ layer is present during development of embryo.
- Ectodermal and endodermal is present.
 - Mesodermal is absent.

Instead of mesodermal are jelly like structure is present that is called mesoglea.

Ex:- Coelenterata and ctenophora.

(ii) Triploblastic :-

The animal which have all the three germ layer is present that is called triploblastic animal.

* Coelom:-

A body cavity that have internal space or a series of space present inside the body.

* Coelom is of three type:-

(I) Coelomate :-

- It is also called Eucoelomate that means true cavity.
- Coelomate are arises in embryonic mesoderm.
- In this type of coelom mesoderms of Embryo provide a cellular lining.
Ex:- Adelaides, Ecnodermata and coelata.

(II) Pseudocoelomate :-

- In some of the animal body cavity is present but it is not completely lined by mesoderm.
- At the place of mesoderm a scattered pouches is present that is called Pseudocoelomate.
Ex:- Aschelminthes.

(III) Acoelomate:-

- Animal which has not true cavity or coelom is present
Ex:- Sponges, Cdeleterata, ctenophora and Platyhelminthes.

* Segmentation of body:-

→ In some of the animal body is internally & externally divided into segments with a serial gravitation atleast some organism.
Ex:- Earthworm

* Earthworm:- Their body shows this pattern of segmentation that is called metamerism & phenomenon is called metamerism.

* Chordata:-

Chordata is a mesodermally derived rod like structure formed on the dorsal side during embryonic development in some animals.

The animal which has notochord are called chordates.

The animal which do not have notochorded is called nonchordata

Ex:- Porifera, Echino Echinodermate

* Phylum porifera :-

- Porifera is also called sponges.
- About 5000 species are known.
- In porifera on their body many Miguel's pores are present.

* Habitat :-

Most are aquatic in which they mostly occur in marine. Some are fresh water.

Ex:- Poriferous sponges.

* Body Symmetry - Asymmetry

* Level of organisation :- A cellular body form: They have minute pore present in their body that help in water transportation and it is called ostio.

They have central cavity is called spongocoel.

They have color cell or choanocytes which represent lining in cell.

There skeletal is made up of spongibr Spongin fibres or spicules.

They having male and female in single body that is called hermaphrodite.

Their fertilization is internal.

They also shows asexual reproduction in which they follow fragmentation.

They shows development through indirect that is through larva stage.

Ex:- Ctenon, Spongilla and Fuspongia.

* Coelenterata or cnidaria :-

Habitat :- They are mostly aquatic in which mostly occur in marine.

They are sessile (fixed) and free living.

* There found in two forms:-

(i) Solitary (single living) or individual living
Ex:- Hydra.

(ii) Colonial :-

These are occur in association with agar individual.

* Body Symmetry :- Radial Symmetry.

* Level of organisation:- Tissue level

* Germ layer:- Diploblastic

→ They have digestive tract that is called gastro vascular cavity.

→ They have single opening in their body, that is called hypostome.

* Hypostome :-

→ Through their single opening entry and exit of material occur.

→ On their body two distinct structure is present i.e. called polyp and medusa.

* Polyp :-

→ Polyp is a sessile and cylindrical structure while medusa is umbrella like structure.

→ They shows extra cellular digestion.

Ex:- Aurelia or Jellyfish, Obelia, Adamsia, Pennatula (Sea pen), Gorgonia (seafan), Meandrina or bread corall.

* Coral leaf :-

→ Coral leaf is composed of continuous accumulation of mound or ridge of limestone.

→ Large size of coral is called coral leaf.

→ Coral is also called wood of sea.

* Ctenophora :-

Ctenophora is also called sea walnut or Comb of sea or comb jellies.

* habitat :-

→ Ctenophora are mostly occur in marine aquatic environment.

→ These are free living.

* Body Symmetry :- Locomotion is due to ciliated comb plate.

* Digestion:- Intra & Extra cellular both.

* Reproduction:- Hermaphrodite (both male & female in single body).

* Fertilization:- External

* Development:- Indirect

* Bioluminescence :- Torch of sea.
Ex:- Pleurobrachia, ctenoplana

* Platyhelminthes :-

→ These organs are dorsoventrally flattened structure

dorsoventrally:- Their upper part is Dorsal and lower part is ventral and it gets flattened that is why they are also called flatworm.

- * Habitat:-
 - living inside host body (parasite)
- * Body Symmetry:- Bilateral.
- * Level of organisation:- organ level.
- * Germ layer:- Triploblastic
- * Coelom:- Acoelomate
- * Digestive track:- having a single opening to outside of body.
 - Behaves as mouth and Anus both
 - Digestive track is absent in tapeworm.
- * Reproduction:- Hermaphrodite (male & female both are present in single body)
- * Fertilization:- Internal
- * Development:- Indirectly.
- * Regeneration:- Planaria is a marine worm that shows regeneration that is regain the body part from a piece of body or from half of the body.

Ex:- Taenia (Tapeworm)

Fasciola (liver fluke)

* Aschelminthes :-

The body of aschelminthes is circular in cross section so it is also called round worm.

This may be free living, Aquatic and charad or paracite in plants and Animal.

Round worm have organ system level of body organisation.

* Body symmetry :- Bilateral.

* Germ layer :- Triploblastic

* Body coelom / Body cavity : pseudocoelomate.

They having muscular pharynx in their Alimentary Canal.

They have excretory wastes from body tube that remove body cavity.

Most Male and female are separate that is disease.

Fertilization - internal.

Development :- Maybe direct or indirect.

Ex:- Ascaris, or roundworm, Wuchereria (Filaria Worm) and Cyclostomi or hookworm

* Annelids :-

- These are aquatic (Marine or fresh water)
- Characterial, free living and sometimes paracytic
- ★ Level of organisation:- Organ system.
- ★ Body Symmetry:- Bilateral symmetry
- ★ Germ layer:- Triploblastic
- On their body small segments are present that is called metamerically segmented structure
- ★ Body Cavity:- Coelomate.
- They having longitudinal and circular muscles that help in locomotion.
- Aquatic Annelids neeru having lateral appendages that is called parapodia and it helps in swimming.
- closed circulatory system is present
- Nephridia is present that helps in osmoregulation and excretion.
- neeru is detritivore while earth worm and leech are monoleucosorous.
- ★ Reproduction- Sexual.
Ex:- nereis, pheretima (earth worm), Hydrinaria (Blood-? Searching leech)

* Arthropoda :-

- It is the largest Phylum of Animal
- Which include insects.
- Over two third ($\frac{2}{3}$) Animal species on this earth is Arthropodes.

→ System of organisation:- Organ system.

* Body Symmetry:- Bilateral Body Symmetry

* Germ layer:- Triploblastic & Segmented

* Body coelom / Body cavity:- Coelomate.

→ Their body is covered by chitinous exoskeleton.

→ Their body consist of head, thorax, Abdomen.

→ They have Joint appendages.

→ Respiratory organs like - gills, book gills, book lungs or tracheal system.

→ Circulatory system is open

→ Sensory organs like Antenna, eye and Balancing organs are present (Statocyst)

- Excretion takes place through malpighian tubules.
- These are most desiduels (Male & Female are Separated)
- They Shows internal fertilization.
- Their development is direct or indirect.
- They are mostly oviparous. (Birth through egg)
Ex:- Apis (honeybee), Bombyx (silk worm).
Laccifer or lac insect
- * Vectors (disease causing).
Anofelis
Culex.
Aedes
gregarious Pest or logical (grass hoot hopper).
- * living Fossil :- limulus or crab.
- * Mollusca :-
- It is the second largest Animal Phylum.
- Mollusca are terrestrial or aquatic
- * Body organisation:- Organ System.
- * Symmetry :- Bilateral
- * Germ layers:- Triploblastic

- Body cavity:- Coelom
- Body is covered by calcareous cell and it is unsegmented.
- Their head muscular foot and visceral hump are single structure.
- The space b/w hump and ^{mantle} mantle is called mantle.
- Their ^{mantle} mantle having cavity that is called mantle cavity
- Their mantle cavity having figure like structure that is called Fallopian gill.
- They have respiratory and excretory functions.
- Their anterior head region have sensory tentacles.
- Their mouth having file like organ that help in feeding that is called radula.

Ex:- Pila (Apple snail)

Dentalium (Tusk shell)

Pinctada (Pearl oyster)

Chaetopilema

Sepia (cuttlefish)

(chiton)

Loligo (squid)

Octopus (Devil fish)

Aplysia (sea-hare)

* Actinodermata:

* Echinodermata:

→ They have endoskeleton of calcareous ossicles

* Habitat:- Marine

* Organisation level - Organ system

* Body Symmetry - In adult it's a radial Symmetry and in larva stage that is bilateral.

→ Distinct structure is Water vascular system that help in locomotion, capture and Transport of food and respiration.

→ Excretory System is absent

→ They have Separate sex

→ Fertilisation is External

→ Development is indirect with free swimming larva.

Ex:- Asterias (Star fish), Echinus (sea urchin)
Antedon (Sea lily), Cucumaria (Sea cucumber)
and Ophiura (Brittle star).

* Hemichordata:

→ Earlier it was consider under chordata latter on it classified into hemichordata.

→ These are small group of worm-like animal.

* Habitat:- Marine.

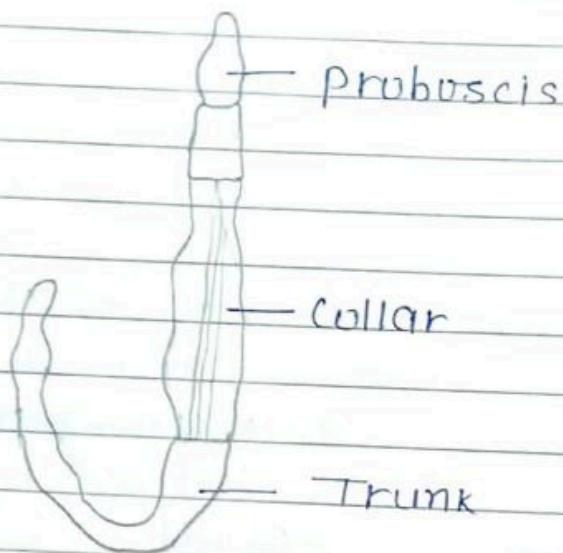
* Body Organisation - Organ system

* Body Symmetry - Bilateral

* Germ layer - Triploblastic

* Body cavity - coelomate

→ Body consist of proboscis, collar and trunk.



→ Circulatory system is open type.

→ Respiratory through gills.

→ Excretory organ is proboscis gland.

→ Sexes are separate.

→ Fertilisation is External.

→ Development is indirect.

Ex:- *Balanoglossus* and *Saccoglossus*.

* Chordata :-

→ Animal which belongs to chordata are fundamentally characterised by the presence of notochord.

→ In these animal a dorsal hollow nerve an cord and paired pharyngeal gill slits are present.

- Symmetry - These having bilateral symmetry.
- Germ layer: Tryploblastic.
- Body cavity or coelom: Coelom.
- Body organisation: Organ system.
- They have Post anal tail and a closed circulatory system.

* Comparison of chordates and non-chordates.

* Chordates

- Notochord present
- Central nervous system is dorsal, hollow and single
- Gill slits are present
- Heart is ventral
- A post anal part (tail) is present

* Non-chordates

- Notochord absent
- Central nervous system is ventral, solid and double.
- Gill slits are absent
- Heart is dorsal (if present)
- Post anal tail is absent.

* Phylum chordata is divided into three types:

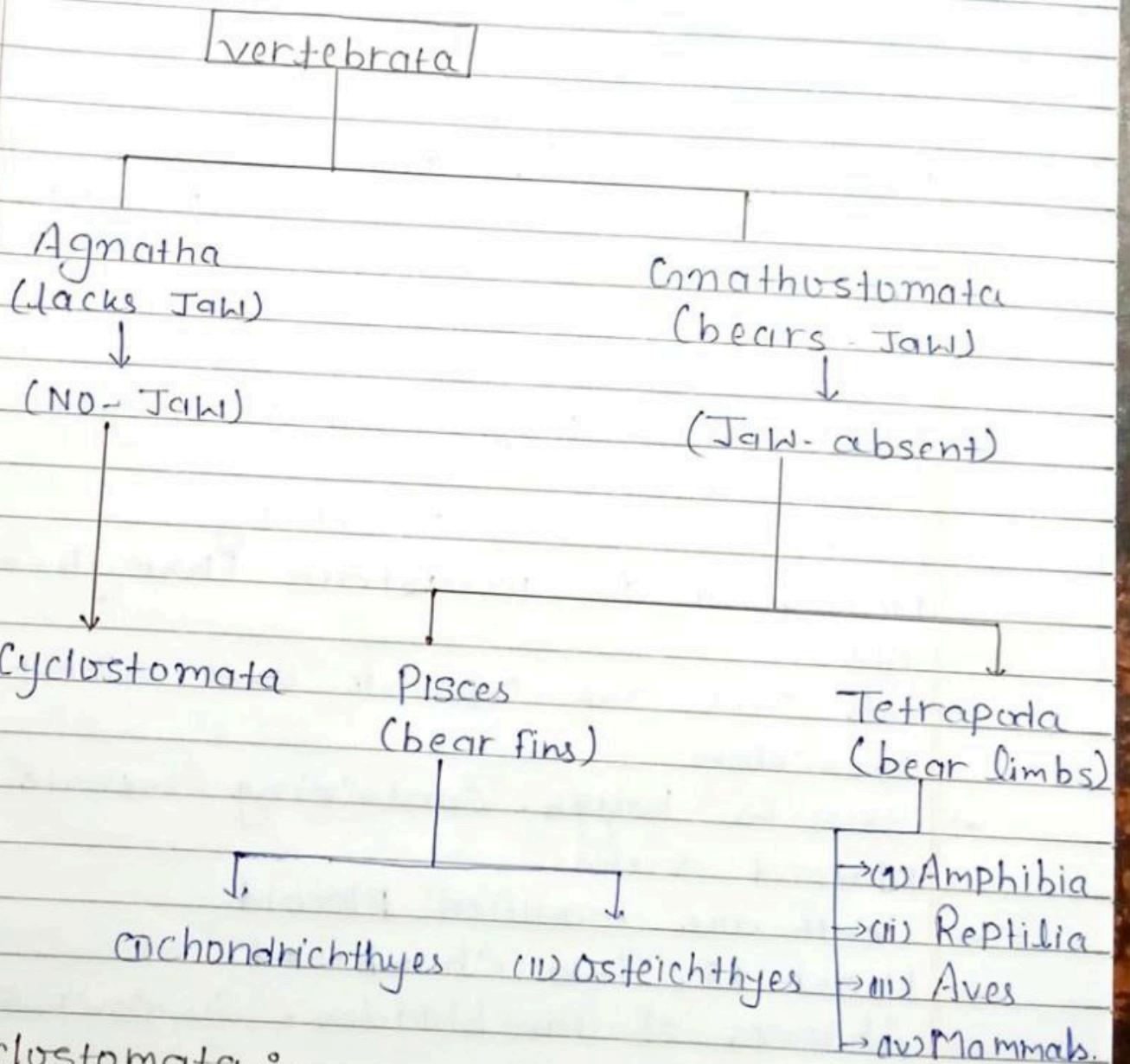
- (i) Urochordata or Tunicata
- (ii) Cephalochordata
- (iii) Vertebrata or vertebrates.

- Some phylum Urochordata and cephalochordata are combined called Protochordata.
- Protochordata are marine.
- In urochordata, notochord is present only in larval tail, while in cephalochordata, it extends from head to tail region and present throughout their life.

Ex:- Urochordata - Ascidia, Salpa, Dolium
Cephalochordata - Branchiostoma

- vertebrates possess notochord during the Embryonic Period.
- notochord is replaced by a cartilaginous or bony vertebral column in the adult.
- * → All vertebrates are chordates but all chordates are not vertebrates
- Chordates basic chordate characters that is present in vertebrates, They have ventral muscular heart with two, three or four chambers.
- Kidney are used for excretion and osmoregulation.

- They have paired appendages which may be Fins or limbs.
- vertebrates are two types.



* Cyclostomata :-

- These having 6-15 pairs of gill slits.
- Cyclostomata having sucking and circular mouth without Jaw.
- Their body is devoid of scales and paired fins.

- They have cranium and vertebral column are cartilaginous.
- They have closed circulatory system.
- Mostly marine, but survive very short duration in fresh water.

Ex:- *Petromyzon* (Lamprey) and *Myxine* (Hagfish).

* Chondrichthyes:-

- Mostly marine
- Streamlined body have cartilaginous Endoskeleton.
- Mouth is located ventrally.
- Notochord is persistent through out the life.
- Gill slits are separate and without operculum
- Skin is tough containing minute placoid scales.
- Teeth are modified placoid.
- Heart is two chambered.
- Absence of air bladder. So can't swim continuously.
- Some of their organisms are electric organs
Ex:- *Torpedo*
- They are cold-blooded
- Male and female are separated
- Fertilization is internal.
- These are mostly viviparous
Ex:- *Squalodon* (Dogfish), *Pristis* (Sawfish)

Ex:- *Carcharodon* (great white shark)
Trygon (sting ray).

* Osteichthyes :-

- These are marine and fresh water.
- Body having endoskeleton bone
- Their body is streamlined.
- Mouth is mostly terminal
- They have four pairs of gills
- They have air bladder.
- Heart is two chambered.
- Sexes are separate.
- These are mostly oviparous and development is direct.

Ex:- Marine - *Exocoetus* (flying fish)

Hippocampus (sea horse)

Freshwater - *Labeo* (*Rohu*)

Catla (*Katla*), *Clarias* (*Mugur*)

Aquarium - *Betta* (fighting fish)

Pterophyllum (Angel fish)

* Amphibia :-

- These are found in water as well as terrestrial space.
- Most having two limbs.
- Their body is divided into head and trunk (tail is not present in all).
- Skin is moist without scales.
- Eye having eyelid.

- Tympanum represents ear.
- Cloaca is combined structure of Alimentary canal, urinary and reproductive tracts.
- Respiration is through gills, lungs and skin.
- Male and female are separate
- Fertilization is External.
- These are oviparous.
- Development is indirect.

Ex:- Bufo (Toad), Rana (Frog), Hyla (Tree Frog)
Salamandra (Salamander), Ichthyophis (Limbless-Amphibia)

* Reptilia :-

- Reptilia word is originated from reptum that means creep or crawl.
- These are mostly terrestrial.
- Their body is covered by dry and cornified skin.
- Epidermal Scales are present
- They do not have ear opening or it is represented by Tympanum.
- Limbs is a two pair.
- Heart is mostly three chambered but Crocodiles having four.
- Reptiles are cold-blooded or Poikilotherms
- Snakes and lizards shed their skin scales.
- Male and female are separate.
- Fertilization is internal.

- They are oviparous.
- Development is direct.

Ex:- chelone (Turtle), Testudo (Tortoise), chameleon (Tree lizard), Calotes (garden lizard), Crocodilus (crocodile), Alligator (Alligator), Hemidactylus (wall lizard), poisonous snakes-Naja (cobra), Bungarus (krait), Vipera (viper).

* Aves :-

- Aves having feathers. Feathers.
- They having birds. beak.
- for limbs limbs are get modified into feather
- Hind limbs are Scales.
- Skin is dry and with glands except oil gland.
- Endoskeleton is fully bony and their long bones are hollow with ~~are~~ air cavities.
- Birds having external digesting chambers that is crop and gizzard.
- Heart is four chambered.
- Warm-blooded or homoiothermous.
- Respiration by gills
- Sexes are sp separate
- Fertilization is indirect
- Mostly oviparous
- development is direct.

Ex:- Corvus (crow), columba (pigeon), Psittacula (parrot), Struthio (ostrich), Pavo (peacock), Aptenodytes (Penguin), Neophron (vulture).

* Mammals:-

- These are found in different habitats
- All mammals having milk producing gland or mammary glands.
- They have two pair of limbs.
- Adapted for walking, running and jumping.
- Their skin having hair appendages
- External ear or pinnae
- different type of teeth are present.
- These having mostly four chambered heart.
- These are warm-blooded or homoiothermous
- Respiration is through lungs
- Male and female are separate
- Fertilization is internal.
- They are viviparous few exceptions are
- development is direct.
- Ex: oviparous - Ornithorhynchus (platypus)
viviparous - Macropus (kangaroo)
Pteropus (flying fox), Camelus (camel)
Macaca (monkey), Rattus (Rat), Canis (dog)
etc.