

Respiratory System

(1)

* Respiration is an oxidation process involving the burning of food substances.

* It may be external (ventilation) and internal i.e. cellular respiration (eg. Glycolysis, TCA cycle).

Types of Respiration:

① Aerobic respiration: Food is oxidized in the presence of oxygen. It involves external respiration: to take O_2 from environment and expell CO_2 (ii) Internal respiration or cellular respiration eg. Glycolysis and krebs's cycle.

② Anaerobic respiration:

* Food is oxidized in the absence of O_2 eg.

Anaerobic bacteria, yeast, Taenia, Ascaris etc.

Aerobic respiration is of 2 types

① Direct respiration: Exchange of gases takes place through body cells directly in which blood is not used eg. aerobic bacteria, protists, plants, sponges, coelenterates, flatworms, round worms etc.

② Indirect respiration: Exchange of gases takes place through blood by special respiratory organs viz. skin, gills, buccopharyngeal cavity, tracheae and ~~pulmon~~ lungs.

Respiratory organs.

① SKIN (Cutaneous respiration) eg. Earthworm

- * Skin of earthworm, Leech and frog is thin, moist, highly vascular and permeable to gases.
- * Atmospheric oxygen dissolved in blood and circulate to tissue as oxygen oxyhaemoglobin
- * CO_2 from tissue dissolved in blood, hence it is brought to skin.
- * Parapodia (locomotory organ) of Nereis is highly vascularized and exchange of gases takes place through it.

② Trachea (Tracheal respiration). Ex. Cockroach

- * Respiratory pigment is lack in blood, so there is direct supply of oxygen to tissue by tracheal system.
- * Spiracles. * These are respiratory pores.
 - * 10 pairs (2 pairs in thorax and 8 pairs in abdomen)
 - * First thoracic and first abdominal always remain open, rest is provided with valve.
- Trachea. * It is ectodermal in origin.
 - * It is lined by cuticle called intima, which prevents collapse of trachea.
 - * Spiracle open into atrium and atrium open in tracheal trunk (3 pairs).
 - * Trachea branches again and again, and

to tracheoles which penetrate in tissue

Tracheoles are without cuticle. They remain filled with fluid. They are site for exchange of gases.

* During rest O_2 enter the tissue through tissue fluid.

* During active tracheole become empty and O_2 directly enter the tissue: CO_2 diffuse out through the body wall.

③ Book Lungs & Book Gills:

* Book lungs are found in scorpion and spider their fold resembles with leaves in a book.

* Book gills are found in Limulus. Book gills take O_2 from water and release CO_2 in the water.

④ Gills (Branchial respiration) eg. Fishes, Prawn,

* Gills are of two types, external and internal.

* External gills are present in Arenicola, Amphitrite (Annelids), damselfly, dragon, fly larva, Necturus, Proteus (~~Amphibia~~), Axolotl larva and tadpole larva (Amphibia).

* Internal gills are found in Prawn, Unio, Pila, Fishes etc.

Gills of Prawn

- * There are 8 pairs of gills, ^{enclosed} ~~enclosed~~ in gill ~~poach~~ chamber.
- * According to origin and attachment, gills are 3 types
 - i) Podobranch (Foot gills) - one in each gill chamber and attached to 2nd maxilliped.
 - ii) Arthrobranch. Two gills in each gill chamber, attached to the 3rd maxilliped.
 - iii) Pleurobranch. There are 5 gills in each gill chamber attached to the lateral wall of thorax bearing 5 walking legs.
- * Gills of Prawn are phyllobranch i.e. they are made up of two rows of gill lamellae or gill plate arranged like plate of books.
- * The gill plates are larger towards middle and smaller towards end.
- * A current of water always flow over gills where exchange of gases takes place.

Gill of Fish (eg. Labeo):

- * It has 4 pairs of gills.
- * Each gill consists of two rows of slender gill filaments projecting into the branchial chamber cover by gill cover or operculum.
- * Gill lamellae are attached to the gill filament like comb (filliform type of gill).
- * Each gill is supported by cartilaginous gill arch, inner border of which bear gill rakers.