RESPIRATION

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CHAPTER

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RESPIRATION

It is a biochemical process of enzyme including oxidative breakdown of organic compounds inside living cells releasing energy in the form of ATP.

BREATHING

The process of intaking O_2 & releasing of CO_2 known as breathing .

RESPIRATION IN PLANTS

By young roots :

- Air occurs in soil interspaces. Root hairs as well as epiblema cells of the young roots are in contact with them. They are also permeable to metabolic gases. Oxygen of the soil air diffuses through root hair-epiblema cells and reaches all internal cells of the young root. Carbon dioxide produced by root cells diffuses in the opposite direction.

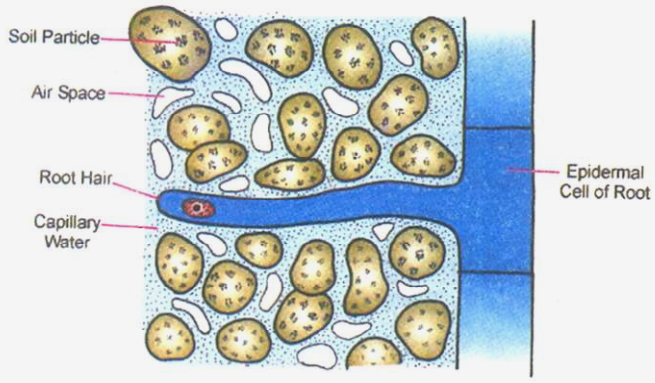

Figure : EPIBLEMA AND ROOT HAIR TAKE PART IN EXCHANGE OF GASES DIRECTLY IN YOUNG ROOTS

By Leaves :

- **Leaves and Young Stems.** Leaves and young stems are ideally suited to quick exchange of gases. The organs have a covering of nearly impermeable epidermis for reducing loss of water. The epidermis of leaves bears a number of aerating pores called **stomata** (singular stoma or stomata, Gk. *stoma*-mouth). Each aerating or stomatal pore is bordered a pair of **guard cells**. In most of the plants, the guard cells are kidney or bean shaped with inner walls being thicker and less elastic than the outer walls.
- When the stomata are open, gases diffuse into and out of the leaf as per their concentration gradient. A gas which has come from outside first reaches substomatal chambers. From here, it diffuses to all the intercellular air spaces present in between the mesophyll cells. If the stomata are open

during night, oxygen from outside will diffuse into the leaves and young stems while carbon dioxide will diffuse out. It is due to respiratory gas exchange.

MAMMALIAN RESPIRATORY SYSTEM

The mammalian respiratory system consists of nasal cavity, pharynx, larynx, trachea, bronchi, bronchioles and alveoli.

Nostril :

- It is also called external nares.

Nasal Chamber :

- Nasal septum divides nasal cavity into two nasal chamber by the nasal septum.

Internal nares :

- There are posterior opening of nasal chambers that leads into pharynx.

Pharynx :

- The pharynx provides passage to both air and food.

Laryngopharynx :

- It is the lower part of pharynx and has a slit like aperature called **glottis**, which can be closed by a leaf like bilobed cartilage **epiglottis**, during swallowing of food bolus.

Larynx :

- It is also called **voice box** or **adam's apple** or **pomas adami**.

Vocal cord :

In larynx, 2 pairs of vocal cord is found outer pair is **false vocal cord** whereas, inner pair is **true vocal cord** when air is forced through the larynx it cause vibration of true vocal cords and sound is produced.

Trachea (Wind pipe) :

- It is long, tubular structure which runs downward through the neck in front of oesophagus. It is supported by cartilage to prevent collapse.

Primary bronchi :

- These are one pair of small thin walled tubular structure formed by the division of trachea. It further divides and end at alveoli.

Lungs :

- lungs are present in thoracic cavity on either side of heart. covered by pleural membrane.

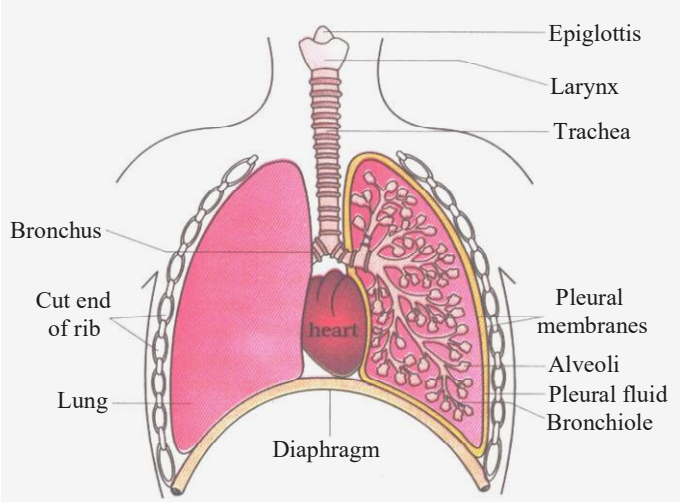

Figure : HUMAN RESPIRATORY SYSTEM

MECHANISM OF RESPIRATION

Respiratory centre is in **Medulla Oblongeta.**

Mechanism of breathing involves Two Phases.

(A) Inspiration

(B) Expiration

Inspiration :

- Intercostal and phrenic muscles of diaphragm contract to increase thoracic cavity, therefore outside rushes inside.

◈ Expiration :

- Intercostal & phrenic relex muscles.
- Due to decrease of thoracic cavity air pressure within lungs increase, the greater pressure within lungs force ful air from lungs to outside of body.

◈ Gaseous Exchange :

- Gaseous exchange occur in Alveoli following pressure gradient O_2 from high pressure in alveoli diffuse into blood & CO_2 from blood in alveoli.

◈ Gaseous Transport :

- O_2 is carried by haemoglobin (in RBC). 100 ml of blood can carry ~20 ml of O_2 max, CO_2 is transported in form of bicarbonates in plasma.

EXERCISE # 1

A. Single Choice Type Questions

Q.1 Which one is anabolic process -
(A) Respiration (B) Digestion
(C) Photosynthesis (D) Ascent of sap.

Q.2 A catabolic process is -
(A) Absorption of minerals
(B) Ascent of sap
(C) Respiration
(D) Assimilation

Q.3 Exchange of gasses ouccurs through
(A) Stomata
(B) Lenticles
(C) Root surfaces
(D) All of the above

Q.4 Glycolysis occurs in -
(A) Cytoplasm
(B) Mitochondria
(C) Chloroplasts
(D) Golgi complex

Q.5 Krebs cycle operates in -
(A) Endoplasmic reticulum
(B) Chloroplasts
(C) Golgi bodies
(D) Mitochondria

Q.6 Which one is a product of glycolysis -
(A) Oxaloacetate
(B) Pyruvate
(C) Ethyl alcohol
(D) Lactic acid

Q.7 Adam's Apple occurs in -
(A) Buffaloes
(B) Dogs
(C) Human males
(D) Human females

Q.8 Muscular partition present between thorax and abdomen is -
(A) Pericardium (B) Pleura
(C) Epiglottis (D) Diaphragm

Q.9 Covering of lungs is -
(A) Pleura (B) Pericardium
(C) Epiglottis (D) Capsule

Q.10 Gaseous exchange occurs in the lungs in the region of -
(A) Trachea (B) Bronchi
(C) Bronchioles (D) Alveoli

Q.11 Trachea and bronchi have -
(A) C-shaped cartilaginous rings
(B) Complete cartilaginous rings
(C) Complete chitinous rings
(D) C-shaped chitinous rings

Q.12 Respiratory tract is lined by ciliated epithelium. The function of cilia is to -
(A) Trap dust
(B) Trap germs
(C) Push out mucus with trapped germs and dust
(D) Push in air vigorously

Q.13 If the thoracic wall but not the lungs is punctured -
(A) The lungs get inflated
(B) The man dies as the lungs get collapsed
(C) The breathing rate decreases
(D) The breathing rate increases

Q.14 Skin is an ideal respiratory organ in frog because it is -
(A) Highly vascular
(B) Kept moist
(C) Devoid of hair and scales
(D) All the above

Q.15 Respiration is -
(A) Anabolic and exergonic
(B) Anabolic and endergonic
(C) Catabolic and exergonic
(D) Catabolic and endergonic

Q.16 Glycolysis occurs in -
(A) Anaerobic organisms
(B) Muscle cells
(C) Prokaryotic cells
(D) Almost all the cells

Q.17 The blood coming out of lungs is richer than that entering into lungs in -

(A) CO_2 (B) O_2

(C) Both (D) None of these

Q.18 Anaerobic respiration is likely to occur in -

(A) Ants (B) Earthworms

(C) Echinoderms (D) Tapeworms

Q.19 Respiratory quotient is -

(A) CO_2/O_2 (B) O_2/CO_2

(C) CO_2/N_2 (D) N_2/CO_2

Q.20 Epiglottis guards the opening of -

(A) Eustachian tube (B) Glottis

(C) Lungs (D) Internal ear

Q.21 Skin is an accessory respiration in -

(A) Humans (B) Frog

(C) Rabbit (D) Lizard

Q.22 The process of respiration is -

(A) Anabolic (B) Catabolic

(C) Metabolic (D) Anaerobic

Q.2 3 Lungs are covered with the covering of -

(A) Pleural membrane

(B) Pericardium

(C) Peritoneum

(D) Mucous membrane

EXERCISE # 2

A. Very Short Answer Type Questions

Q.1 What is respiration ?

Q.2 What are stomata ?

Q.3 Name the energy currency of living system.

Q.4 What is respiratory organ ?

Q.5 What is diaphragm ?

Q.6 Define glottis.

Q.7 What is epiglottis ?

Q.8 Define breathing

Q.9 What is inspiration ?

Q.10 Define expiration.

Q.11 Name the common passage for food and air.

Q.12 What is the shape of diaphragm during expiration ?

Q.13 What is the shape of cartilaginous rings in trachea ?

B. Short Answer Type Questions

Q.14 Differentiate between photosynthesis and respiration.

Q.15 Distinguish between breathing and respiration.

Q.16 Differentiate between bronchioles and tracheoles.

Q.17 What is the composition of inhaled and exhaled air ?

Q.18 Differentiate between inspiration and expiration.

Q.19 What are the functions of nasal passage ?

C. Long Answer Type Questions

Q.20 Name the respiratory organs in the following :
(a) a fish (b) a bird (c) an earthworm

Q.21 How is respiration different from breathing ?

Q.22 Explain the processes of 'aerobic' respiration and 'anaerobic' respiration.

Q.23 Draw a diagram showing 'human respiratory system'. Label its following parts
(i) Larynx (ii) Trachea
(iii) Primary Bronchus (iv) Lungs.

Q.24 Why do the walls of the trachea not callapse when ther is less air in it & write its importance ?