SHORT QUESTIONS

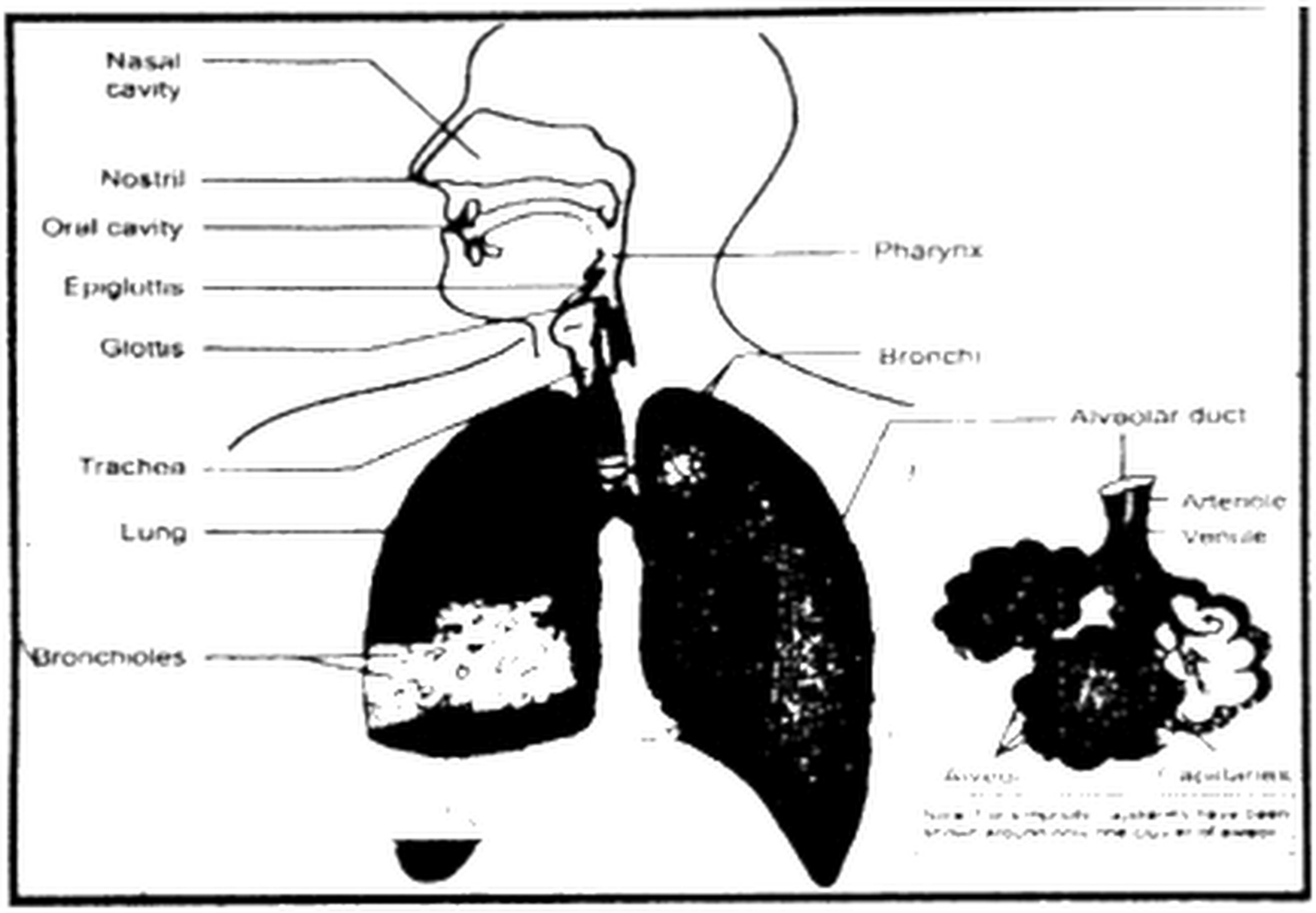
1. Differentiate between breathing and cellular respiration.

Ans. Difference between breathing and cellular respiration:

Cellular respiration	Breathing
i. Organism get the oxygen needed for cellular respiration form their environment and provide it to their cells. The carbon dioxide produced during cellular respiration is taken out of the cells and ultimately from the body. Taking in oxygen and giving out of carbon dioxide is terms as Gaseous exchange.	**i.** The term breathing is used for the process through which animals take air in their bodies to get oxygen from it and then give out the air for getting rid of carbon dioxide.
ii. Respiration involves the mechanical and bio-chemical processes	**ii.** Breathing is only the mechanical or physical process of exchange of gases
iii. Cellular respiration occurs in the cells in the following steps glycolysis (no O_2 needed)."prep step", Krebs cycle, chemiosmosis/ ETC (electron transport chain)	**iii.** Breathing is exhaling and inhaling. Breathing is what provides the O_2 needed for cellular respiration, and helps dispose of the waste products of cellular respiration and helps dispose of the waste product of cellular respiration CO_2.

2. Trace the path of air from the nasal cavity to the alveoli.

Ans. Path of air from the nasal cavity to the alveoli:



3. **How will you differentiate between a stoma and a lenticel?**

Ans. Difference between a stoma and lenticels:

Stoma	Lenticels
i. Stoma are present on the lower surface of leaf.	**i.** Lenticels are present on the outer layer of woody or hard stem.
ii. They are involved in gaseous exchange, transpiration, removal of extra water and waste.	**ii.** They are used for removal of waste.
iii. Stoma occurs in the epidermis.	**iii.** Lenticels present in the cork surface of the stems, root, and other parts of vascular plants.
iv. Stoma has guard cells.	**iv.** Lenticel has no guard cells.

OR

1) Stomata (singular stoma) in botany a stoma (also stomata plural stomata) is a pore, found in the leaf and stem epidermis that is used for gas exchange.

The pore is formed by a pair of specialized parenchyma cells known as guard cells which are responsible for regulating the size of the opening.

Air containing carbon dioxide enters the plant through these openings where it is used in photosynthesis and respiration.

2) Lenticel = A lenticel is a spongy area present in the cork surfaces of the stems, roots, and other parts of vascular plants.

It appears on the surface as a lenticular (lens-shaped) spot, which acts as a pore.

These structures allow for the exchange of gases between the internal tissues and atmosphere to occur across the periderm, which would otherwise prevent this exchange of gases.

UNDERSTANDING THE CONCEPT

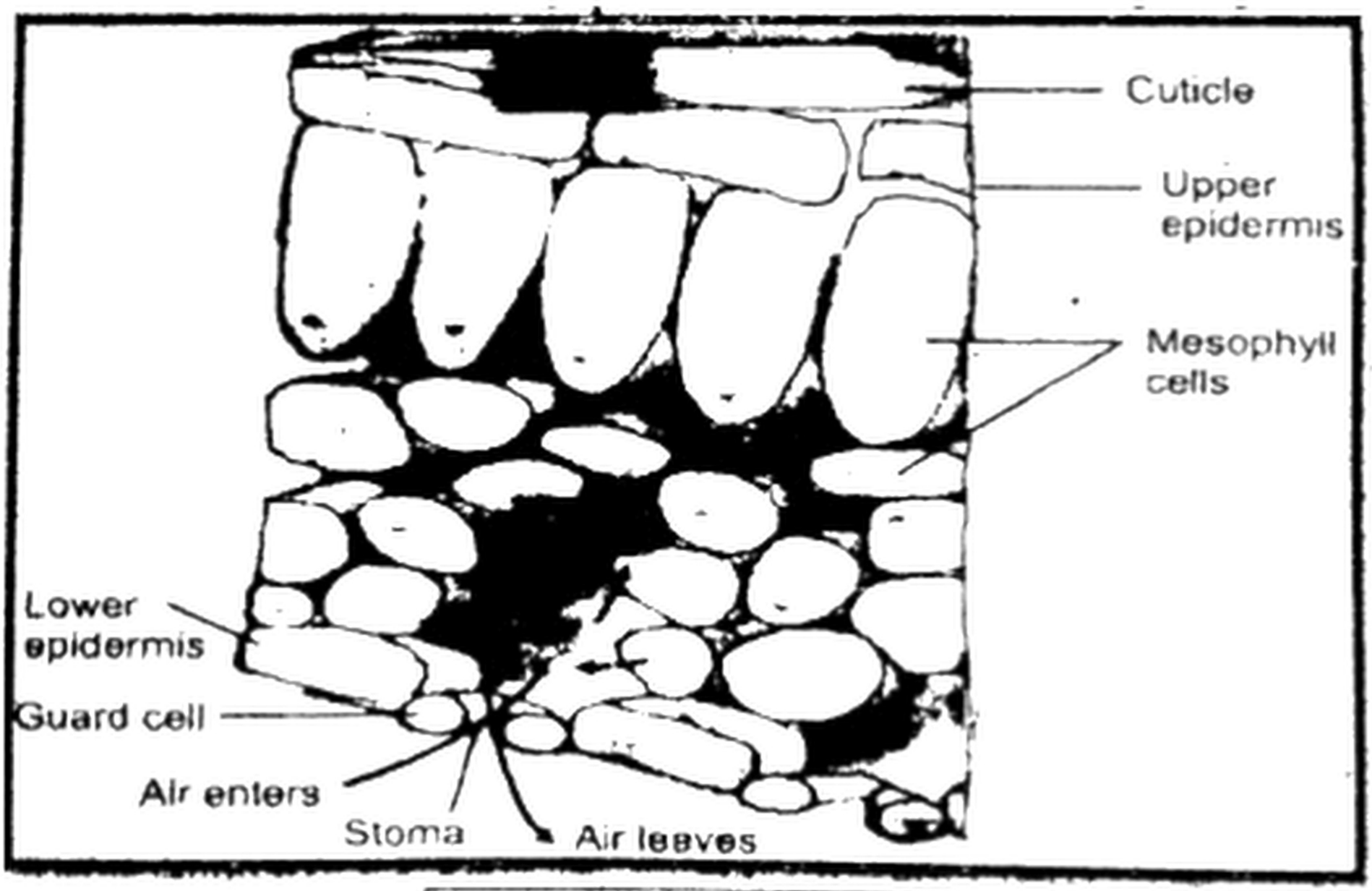
1. **How do the different parts of the plant body exchange gases with the environment?**

Ans: Gaseous exchange in plants:

Plants have no organs or systems for the exchange of gases with the environment. Every cell of the plant body exchanges gases with the environment by its own.

Gaseous exchange in stomata:

The leaves and young stems have stomata in their epidermis. The gaseous exchange occurs through these stomata. The inner cells of leaves (mesophyll) and stems also have air spaces among them, which help in the exchange of gases



Gaseous exchange in a leaf

Gaseous exchange in a leaf:

Leaf cells face two situations.

Gaseous exchange in a leaf during daytime:

During the daytime when the mesophyll cells of leaves are carrying out photosynthesis and respiration side by side, the oxygen produced in photosynthesis is utilized in cellular respiration. Similarly, the carbon dioxide produced during cellular respiration is utilized in photosynthesis.

Gaseous exchange in a leaf during night:

However, during night when there is no photosynthesis occurring the leaf cells get oxygen from the environment and release carbon dioxide through stomata.

Gaseous exchange in stems and roots:

Lenticels:

In woody stems and mature roots, the entire surface is covered by bark which is impervious to gases or water. However, there are certain pores in the layer of bark. These are called the lenticels.

Note:

The lenticels are slightly more raised than the general surface of the stem

Gases diffuse in and out of the general surface of the young roots. The gases are found in the 6il surrounding the roots.

Gaseous exchange in aquatic plants:

The aquatic plants get the oxygen dissolved in water and release carbon dioxide in the water.

2. Write down the steps of inhalation and exhalation.

Ans. The Mechanism of Breathing:

The physical movements associated with the gaseous exchange are called breathing. There are two phases of breathing i.e. inhalation and exhalation

Inhalation is a process where you intake oxygen through the nostrils and exhalation is breathing out carbon dioxide through the same airways.

i. Steps of Inspiration or Inhalation:

During inspiration the rib muscles contract and rids are raised at the same time the dome-shaped diaphragm contracts and is lowered. These movements increase the area of the thoracic cavity, which reduces the pressure on lungs. As a result, the lungs expand and the air pressure within them also decreases the air from outside rushes into the lungs to equalize the pressure on both sides.

ii. Steps of Expiration or Exhalation:

After the gaseous exchange in the lungs. The impure air is expelled out in exhalation. The rib muscles relax bringing the ribs back to the original position. The diaphragm muscles also relax and it gets its raised dome shape. This reduces the space in the chest cavity and increases the pressure on lungs. The lungs contract and the air are expelled out of them.

Comparison between the inspired and the expired air

Feature	Inspired Air	Expired Air
Amount of oxygen	21%	16%
Amount of carbon dioxide	0.04%	4%
Amount of nitrogen	79%	79%
Amount of water vapors	Variable	Saturated
Amount of dust particles	Variable	Almost none
Temperature	Variable	Almost equal to body temperature

3. State the signs and symptoms, causes and treatments of bronchitis, emphysema and pneumonia.

Ans: i. Bronchitis:

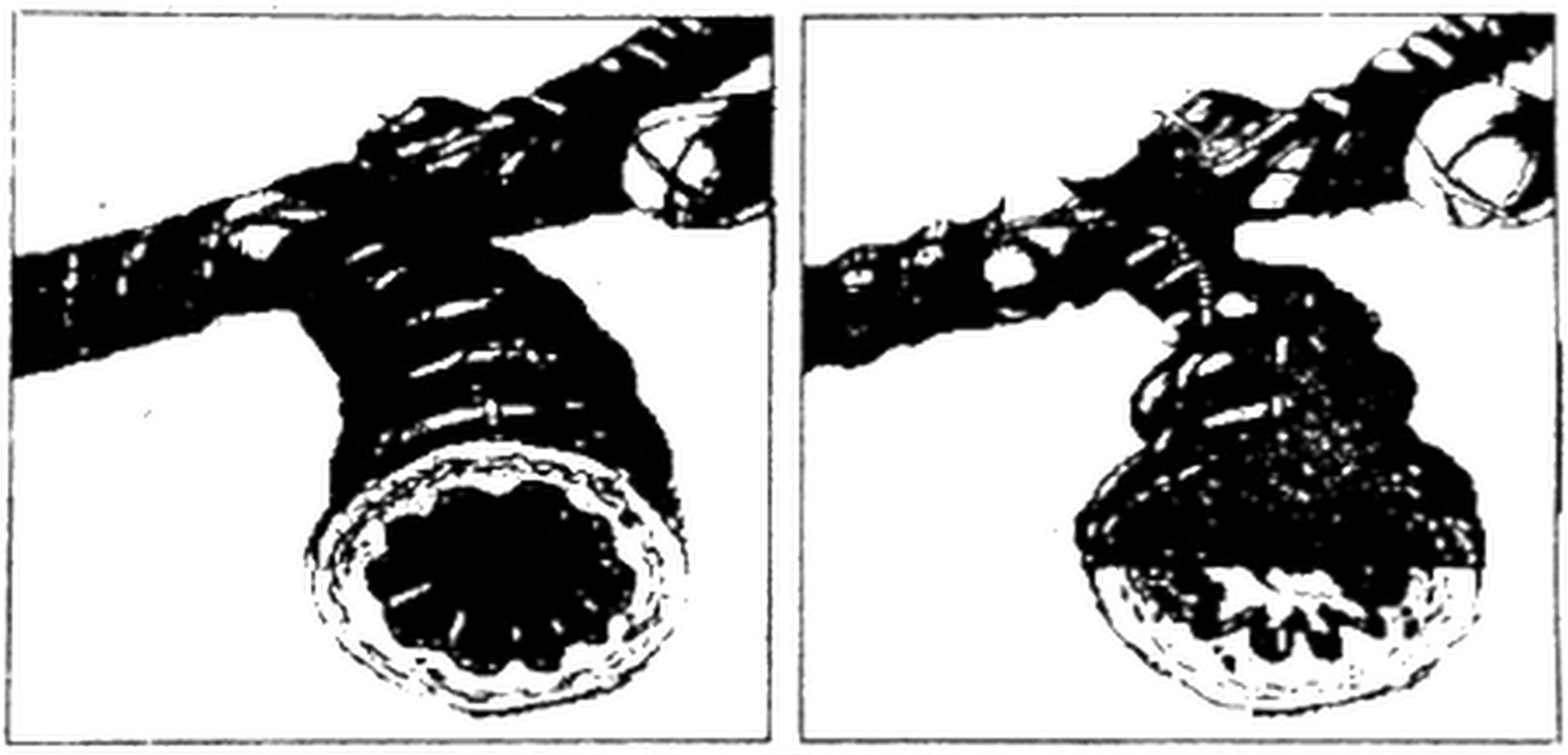
Bronchitis is the inflammation of the bronchi or bronchioles.

Reasons:

It results in excessive secretions of mucus into the tubes, leading to the swelling of tubular walls and narrowing of tubes.

Causes:

It is caused by viruses, bacteria or exposure to chemical irritants (e.g. tobacco smoke).



Bronchi: normal (left) and inflamed (right)

Types of bronchitis:

There are two major types of bronchitis i.e. acute and chronic.

Acute bronchitis:

The acute bronchitis usually lasts about two weeks and patients recovers with no permanent damage to the bronchi or bronchioles.

Chronic bronchitis:

In chronic bronchitis, the bronchi develop chronic inflammation. It usually lasts for three months to two years.

Sign and Symptoms:

Symptoms of bronchitis include a cough, mild wheezing, fever, chills and shortness of breath (especially when doing hard job).

Treatments and drugs:

In most cases, bronchitis requires only self-care treatments such as:

Getting more rest

Taking over-the-counter pain medications

Drinking fluids

Breathing in warm, moist air

Medications:

In some circumstances, doctor may prescribe medications, including:

i Antibiotics **ii.** Cough medicine

Note:

The majority of people diagnosed with chronic bronchitis are 45 'years of age or older

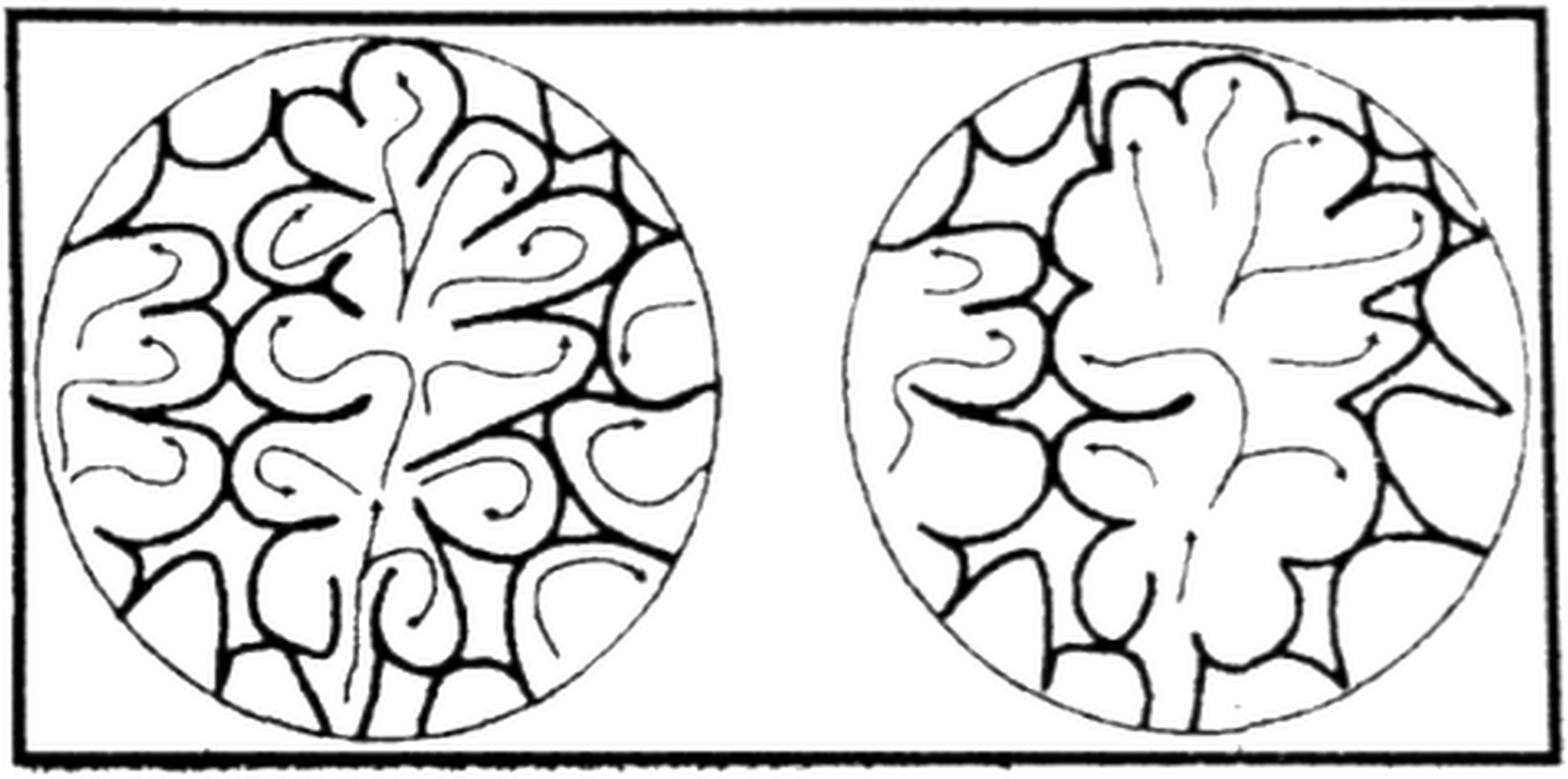
ii. Emphysema:

Emphysema is the destruction of the walls of the alveoli.

Causes:

It results in larger sacs but with less surface area for gaseous exchange. As lung tissue breaks down the lungs do not come back to their original shape after

exhalation. So air cannot be pushed out and is trapped in the lungs.



The Alveoil; normal (left) and emphysema (right)

Sign and symptoms:

The symptoms of emphysema include shortness of breath, fatigue, recurrent respiratory infections and weight loss. By the time the symptoms of emphysema appear, the patient has usually lost 50% to 70% of his / her lung tissue. The level of oxygen in blood may get so low that it causes serious complications.

Treatment and drugs:

Inhaled steroids:

Corticosteroid drugs inhaled as aerosol sprays may help relieve shortness of breath.

Antibiotics are also used for the treatment of emphysema.

iii. Pneumonia:

Pneumonia is an infection of lungs. If this infection affects both lungs, it is called double pneumonia.

Causes:

The most common cause of pneumonia is a bacterium, *Streptococcus* pneumonia. Some viral influenza virus) and fungal infections may also lead to pneumonia.

Sign and symptoms:

When the causative organisms enter the alveoli, they settle there and grow in number. They break the lung tissues and the area becomes filled with fluid and pus. The symptoms of pneumonia include a cold that is followed by a high fever, shivering, and a cough with sputum production. Patient may become short of breath. The patient's skin colour may change and become dusky or purplish. It is due to poor oxygenation of blood

Treatment and drugs:

Vaccines are available to prevent pneumonia caused by *S pneumoniae*. Antibiotics are used in the treatment of this type of pneumonia.

4. How does the tobacco smoke damage the respiratory system?

Ans. Bad Effects of Smoking:

i. Chemicals cigarettes:

Smoking is harmful due to the chemical's cigarettes and smoke. Tobacco smoke contains over 4000 different chemicals, out of which at least 50 are carcinogens and many are poisonous. Many people think that lung cancer is the only smoking-related disease and it is the number one cause of death among smokers but it is not right. Cigarette smoke affects the body from head

to toe. Smokers have a much higher risk of developing a number of life-threatening diseases.

Smoking lead to the cancers:

Smoking may also lead to the cancers in kidneys, oral cavity, larynx, breast, bladder and pancreas etc. Many chemicals in tobacco smoke damage the air passageway, which leads to emphysema and other respiratory disorders.

Effects on the circulatory system:

Smoking also has effects on the circulatory system. The carbon monoxide present in tobacco smoke lessens the oxygen-carrying capacity of hemoglobin. Many other chemicals in smoke increase the production of blood platelets. When platelets are more than the normal numbers, they make the blood viscous and it can lead to arteriosclerosis

Effects on lungs:

Smokers are at greater risk of developing infections particularly in the lungs. For example, smoking increases the risk of tuberculosis by two to four times, and of pneumonia by four times. Smoking is also responsible for weakening smoke, and staining the teeth Tooth loss is 2 to 3 times higher in smokers than in non-smokers.