PRACTICAL NO.: 14. b **DATE:**

AIM: STUDY OF RESPIRATORY SYSTEM WITH THE HELP OF CHART AND MODELS.

REQUIREMENT: Models, charts and specimens of respiratory system

THEORY

Respiration:

Respiration means exchange of gases—oxygen and carbon dioxide—between the atmospheric air, blood, and tissue cells. Inhalation and exaltation, inspiration and expiration, breathing in and breathing out known as respiration.

The respiratory system consists of the nose, pharynx (throat), larynx (voice box), trachea, windpipe), bronchi, and lungs.

Its parts can be classified according to either structure or function.

Structurally, the respiratory system consists of two parts:

1. **The upper respiratory system:** It includes the nose, pharynx, and associated structures.
2. **The lower respiratory system:** It includes the larynx, trachea, bronchi, and lungs.

Types of respiration:

There are 3 types of respiration:

1. **Pulmonary Ventilation:** Exchange of Oxygen and Carbon Dioxide between air and lungs known as pulmonary ventilation.
2. **External respiration:** Exchange of Oxygen and Carbon Dioxide between lungs and blood known as external respiration.
3. **Internal Respiration:** Exchange of Oxygen and Carbon Dioxide between blood and cell known as internal respiration.

1. NOSE:

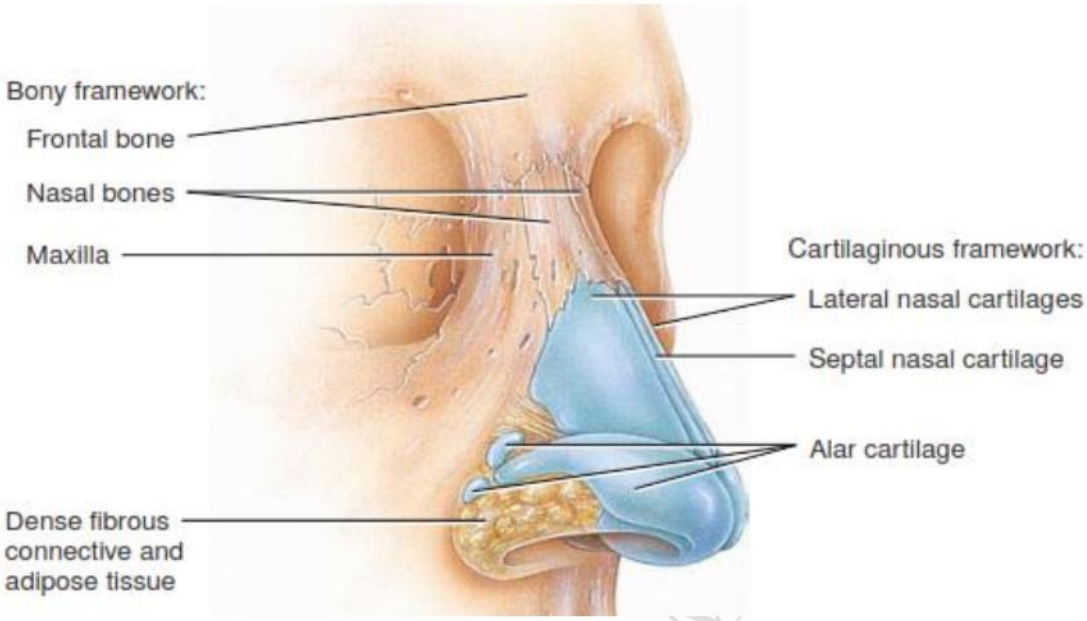
Nose is made up by two kind of frame work:

i. Bony frame work:

It is made up by Frontal bone, Nasal Bone and Maxilla

ii. Cartilage Frame Work:

It is made up by Lateral Nasal Cartilage, Septal Nasal Cartilage and Alar Cartilage

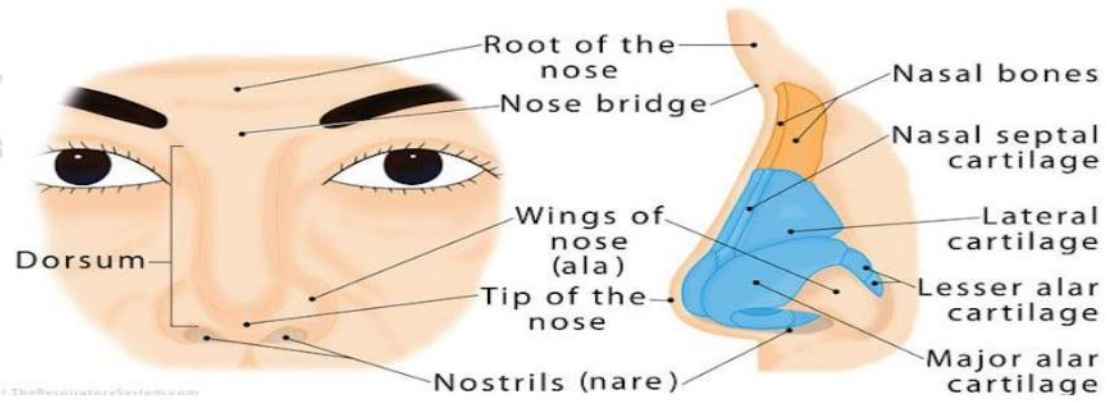


The nose can be divided into external and internal portions.

The external nose:

- It is the portion of the nose visible on the face and consists of a supporting framework of bone and hyaline cartilage covered with muscle and skin and lined by a mucous membrane.
- The external nose is somewhat flexible because it consist hyaline cartilage.
- External nose consist two opening which is known as external nares or nostrils divided by vertical septum.
- External nose also consist of hair inside the nostril.
- The external nose have three functions:
  i. Warming, moistening, and filtering incoming air;
  ii. Detecting olfactory stimuli or identify the smell
  iii. Modifying speech

The internal nose:



- Anteriorly, the internal nose merges with the external nose, and posteriorly it communicates with the pharynx through two openings called the internal nares or choanae.
- The space within the internal nose is called the nasal cavity.
- The anterior portion of the nasal cavity just inside the nostrils, called the nasal vestibule, is surrounded by cartilage.
- The superior part of the nasal cavity is surrounded by bone.
- A vertical partition, the nasal septum, divides the nasal cavity into right and left sides.
- Superior attachment of the nose to the frontal bone is known as Root.
- Tip of nose known as Apex.

2. PHARYNX (THROAT)

- It is a funnel-shaped tube about 13 cm (5 in.) long
- It starts from the internal nares and extends to the level of the cricoid cartilage, the most inferior cartilage of the larynx (voice box)
- Its wall is composed of skeletal muscles and is lined with a mucous membrane.
- Contraction of the skeletal muscles assists in deglutition (swallowing).
- The pharynx functions as a passageway for air and food.
- It provides a resonating chamber for speech sounds, and houses the tonsils, which participate in immunological reactions against foreign invaders.
- The pharynx can be divided into three anatomical regions:

i. Nasopharynx:

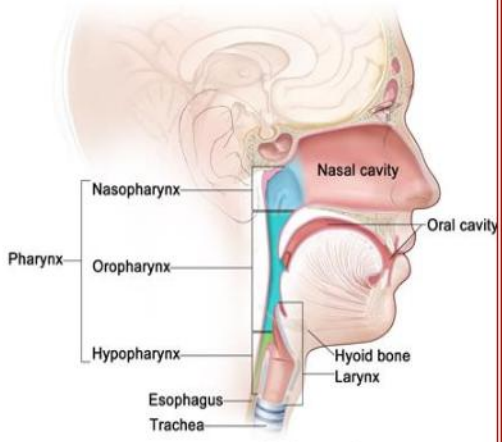
- It is the superior portion of the pharynx.
- It lies posterior to the nasal cavity and extends to the soft palate.
- There are five openings in its wall: two internal nares, two openings that lead into the auditory tubes (commonly known as the Eustachian tubes), and the opening into the oropharynx.

ii. Oropharynx:

- It extend behind mouth from soft palate to level of hyoid bone.
- This portion of the pharynx has both respiratory and digestive functions, serving as a common passageway for air, food, and drink. Because the oropharynx is subject to abrasion by food particles, it is lined with nonkeratinized stratified squamous epithelium.
- Oropharynx consist, the palatine and lingual tonsils.

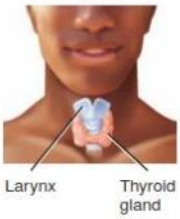
iii. **Laryngopharynx:**

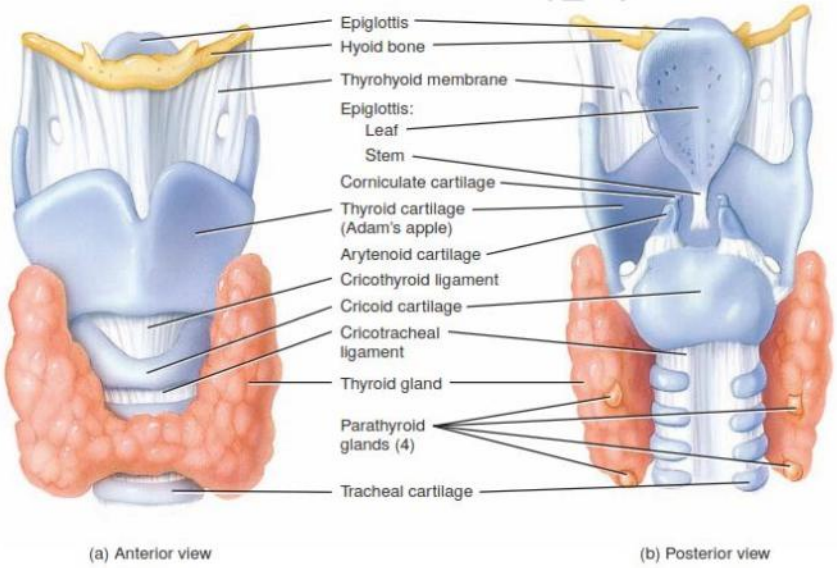
Its end portion open in to the esophagus (food tube) and the larynx (voice box).



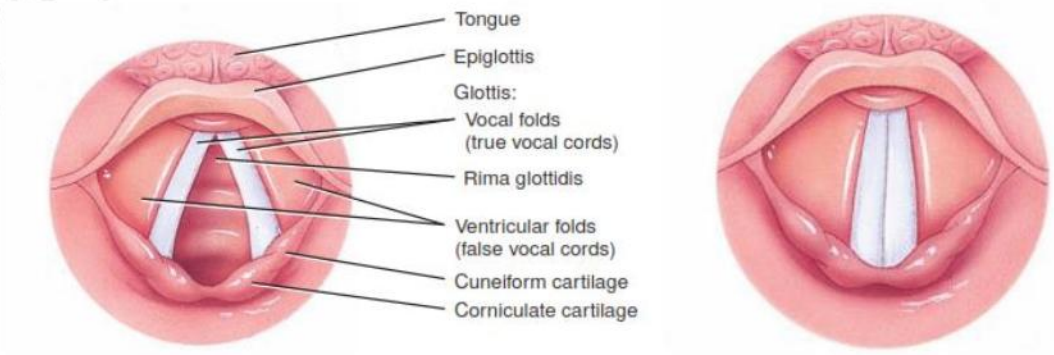
3. LARYNX (VOICE BOX)

- The larynx is known as voice box.
- It connects the laryngopharynx with the trachea.
- The wall of the larynx is composed of nine pieces of cartilage:
  - Three occur singly (thyroid cartilage, epiglottis, and cricoid cartilage), and
  - Three occur in pairs (arytenoid, cuneiform, and corniculate cartilages).
- During swallowing, larynx move down the the epiglottis so food not enter into the wind pipes.

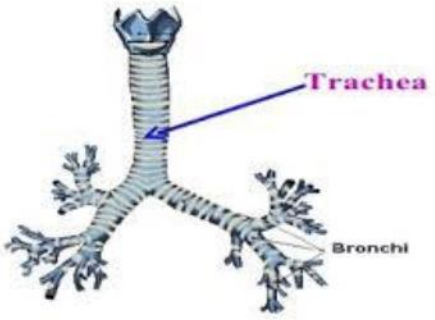




- The mucous membrane of the larynx forms two pairs of folds a superior pair called the ventricular folds (false vocal cords) and an inferior pair called the vocal folds (true vocal cords).



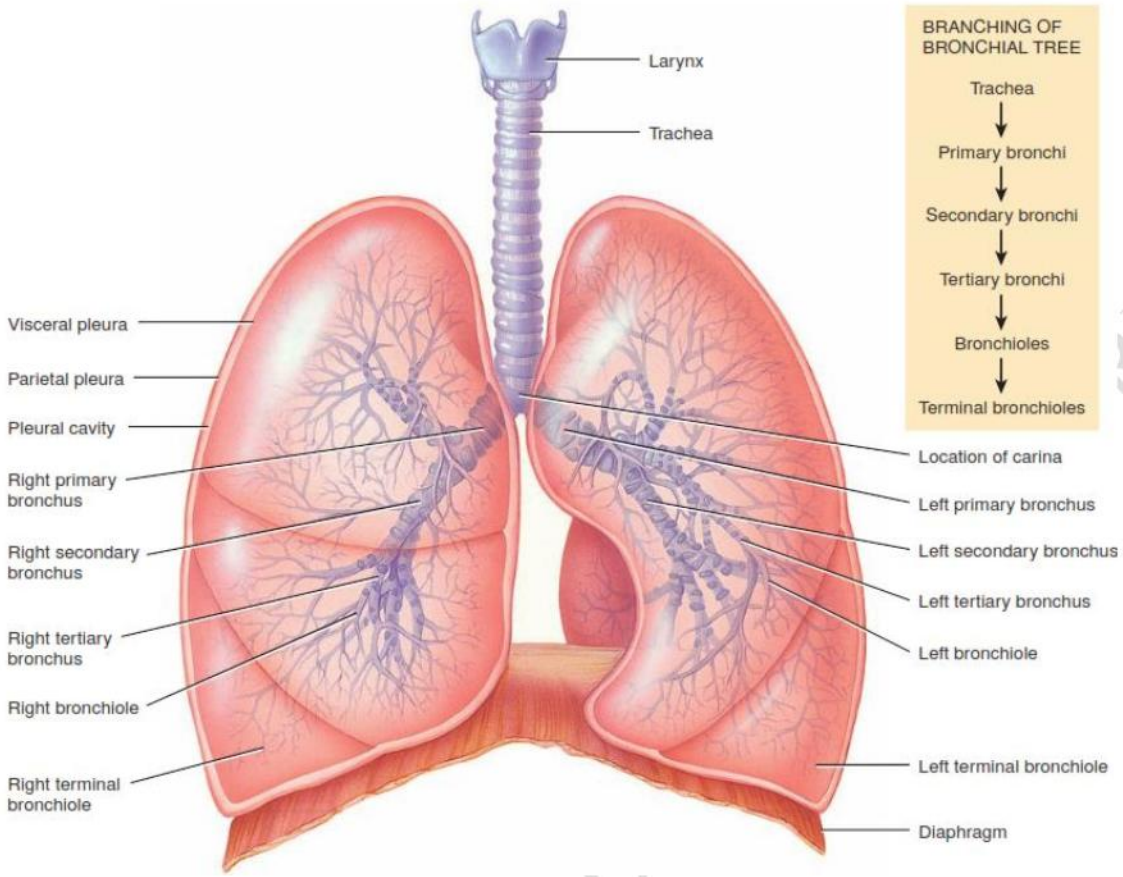
4. TRACHEA



- Trachea is also known as windpipe.
- It is a tubular passageway for air.
- It is about 12 cm (5 in.) long and 2.5 cm (1 in.) in diameter.
- It is extends from the larynx bronchi.
- Trachea consist 16–20 incomplete, horizontal rings of hyaline cartilage resemble the letter C.
- The open part of each C-shaped cartilage ring faces posteriorly toward the esophagus.

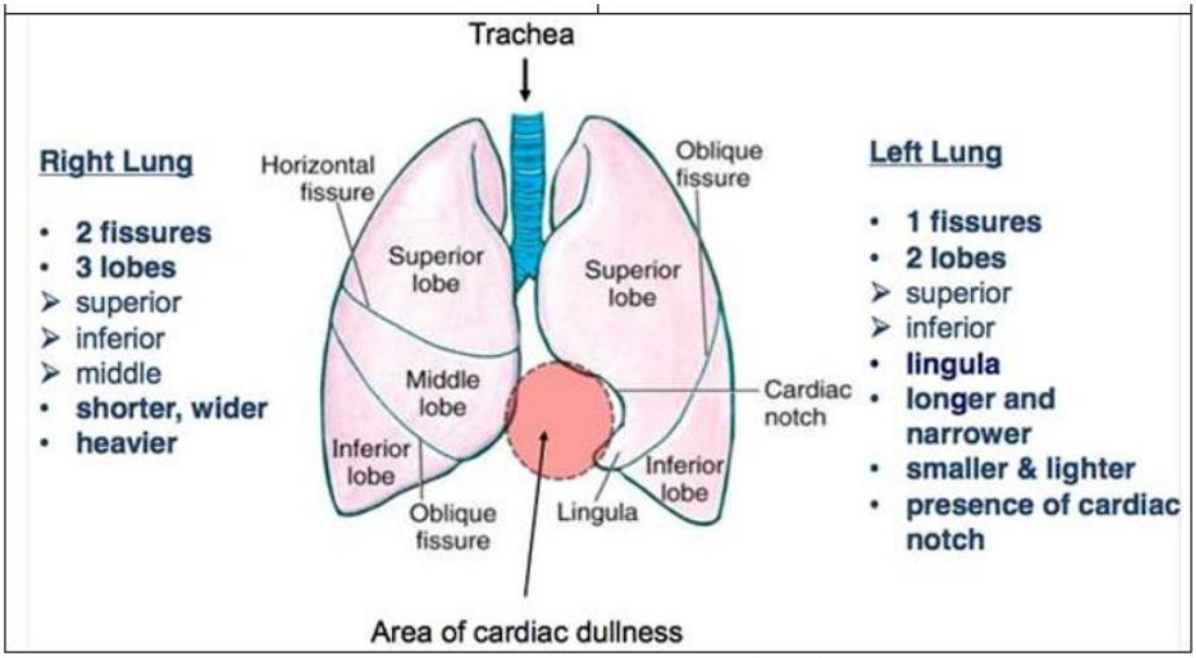
5. BRONCHI

- The trachea divides into a right and left primary bronchi.
- Right primary bronchi goes into the right lung, and a left primary windpipe bronchi, which goes into the left lung.
- The right primary bronchi is more vertical, shorter, and wider than the left.
- As a result, an aspirated object is more likely to enter and lodge in the right primary bronchus than the left.
- The primary bronchi contain incomplete rings of cartilage like trachea.
- The primary bronchi in to the lungs divide to form smaller bronchi known as the secondary (lobar) bronchi, one for each lobe of the lung. (The right lung has three lobes; the left lung has two.)
- The secondary bronchi branches known as tertiary (segmental) bronchi it further divide in to bronchioles.
- Bronchioles further divide in to smaller branches known as terminal bronchioles.
- This branch like structure resembles an inverted tree and is commonly referred to as the bronchial tree.



6. LUNGS

- There are two lungs in human body.
- It is cone-shaped organs reside in the thoracic cavity.
- Lungs are separated from each other by the heart and other structures in the mediastinum.
- Each lung is enclosed and protected by a double-layered serous membrane known as the pleural membrane.
- The superficial layer is parietal pleura and the deep layer is the visceral pleura.
- Between the visceral and parietal pleurae there is a small space which is known as the pleural cavity, which contains a small amount of lubricating fluid secreted by the membranes.
- This pleural fluid reduces friction between the membrane of lungs and allowing them to slide easily over one another during breathing.
- The broad inferior portion of the lung is known as the base and narrow superior portion of the lung is the apex.



- Right lung is shorter and wider than the left lungs because right side lobes of liver occupy more space than the left lobes.
- Left lung is long and narrow and it has lingula portion because left side of lung consist cardiac notch.
- Right lung capsular layer is thicker than the left lung.
- Right side of lung consist horizontal and oblique fissure so it divide in to three lobes, 1. Superior lobe 2. Middle lobe 3. Inferior lobe
- Left side of lung consist only oblique fissure so it divide in to two lobes, 1. Superior lobe and 2. Inferior lobe

7. BRONCHIOLES

- It is a smallest branches of respiratory tree having <1mm diameter.
- It do not consist cartilage rings but larger branches may have small patches of cartilage
- Asthma like disease condition affects the smallest terminal bronchioles

8. ALVEOLI

- Smallest bronchioles have clusters of tiny sacs branching off known as alveoli which produce "grapelike clusters."
- Each lung consist 300-500 million alveoli.
- It is made up by Single cell layer of thick squamous epithelium.
- Alveoli are the "functional units" of the respiratory system
- It is the actual site of gas exchange with blood.

- Alveoli increase in number and size until adolescence after adolescence, can increase in size only and if damaged, it has limited ability to repair themselves

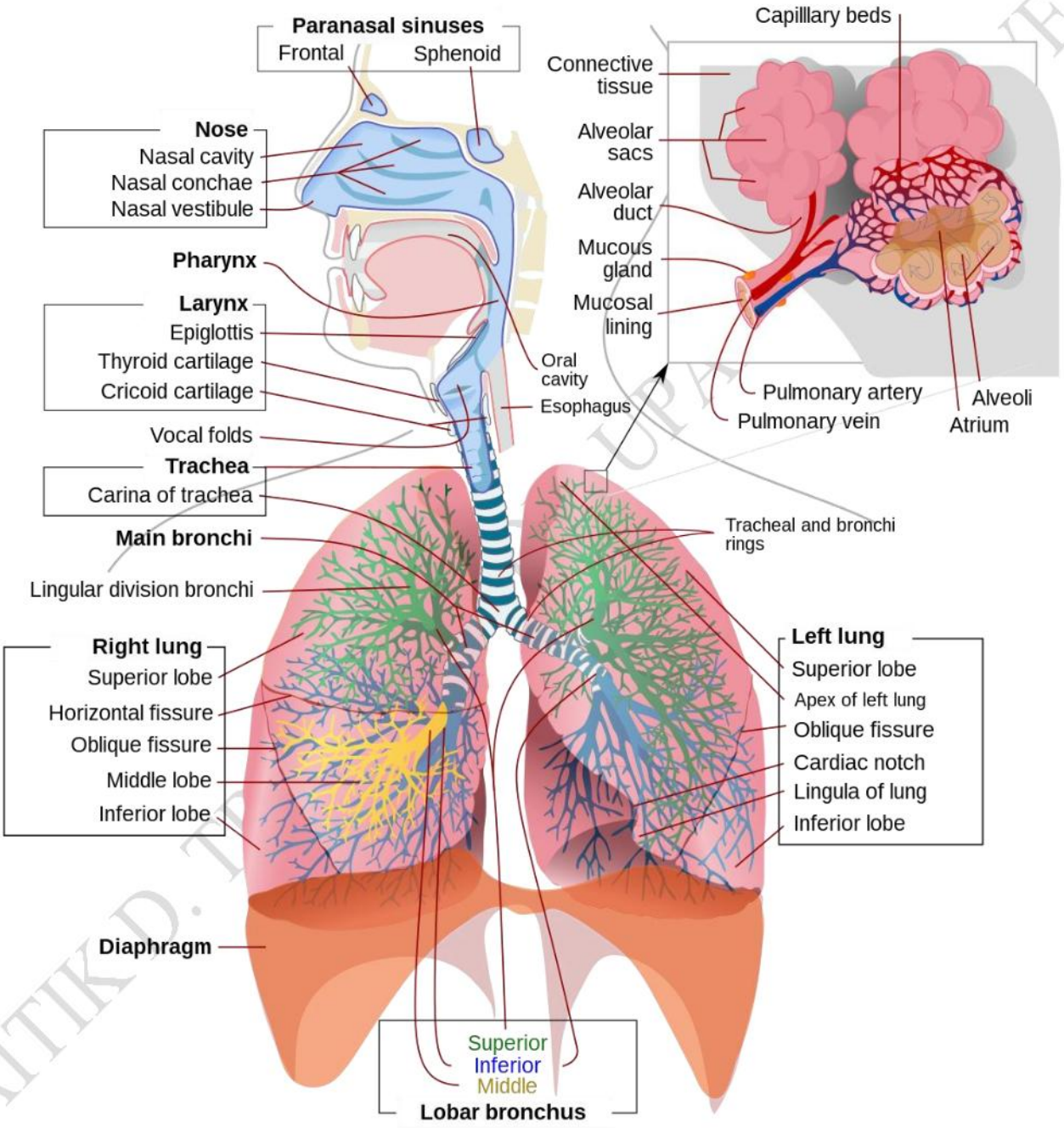


DIAGRAM OF RESPIRATORY SYTEM

SIGNATURE OF TEACHER