Respiratory system

Objectives: The student must be able to:

1. Define the term respiration.
2. State the process of respiration.
3. Describe the structure of the respiratory system.
4. Explain mechanism ventilation.

Process of respiration

- Living organisms have of performing their vital activities by means of energy produced within them.
- This energy producing process is termed respiration.
- A system doing this is called respiratory system.
- Process of respiration has following phases-

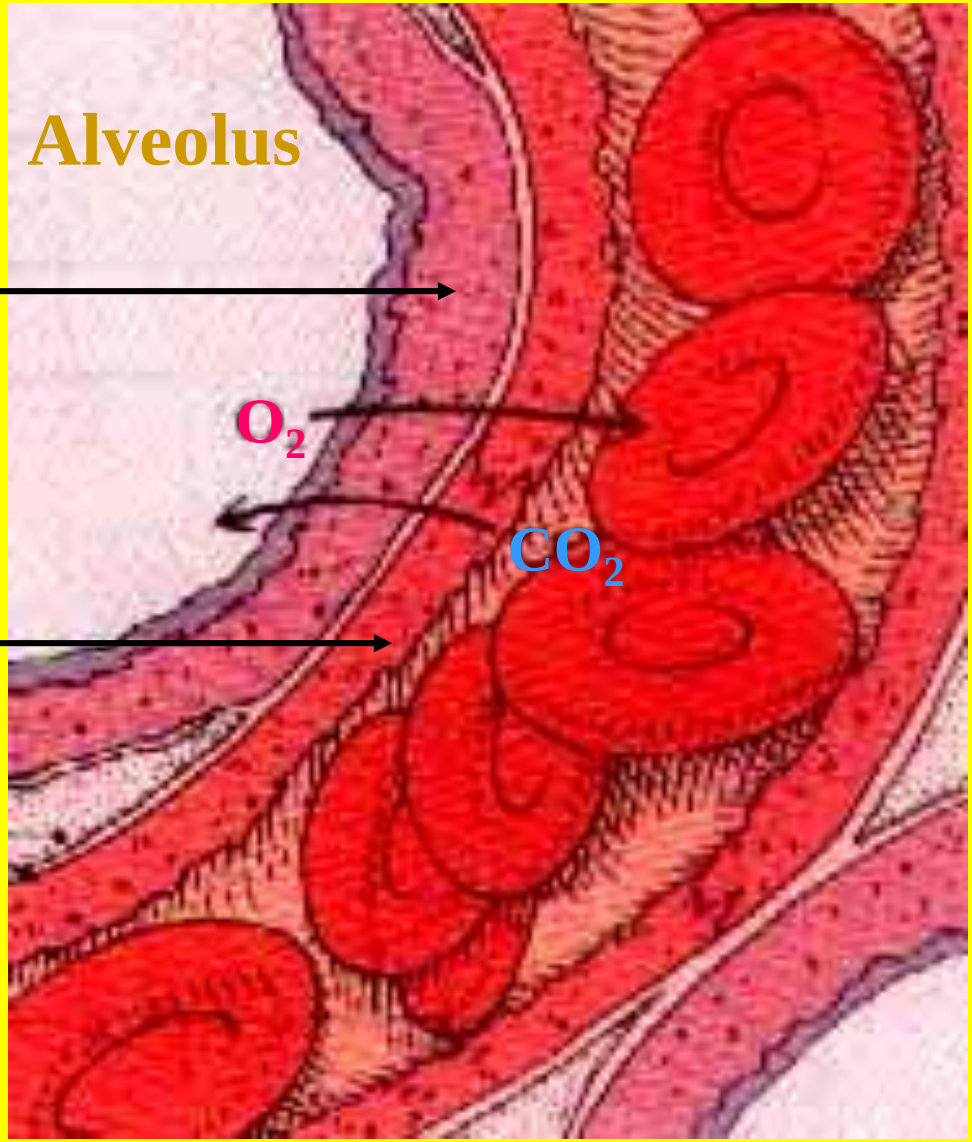
(a) External respiration

(b) Gaseous transport

(c) Internal respiration

(d) Cellular respiration

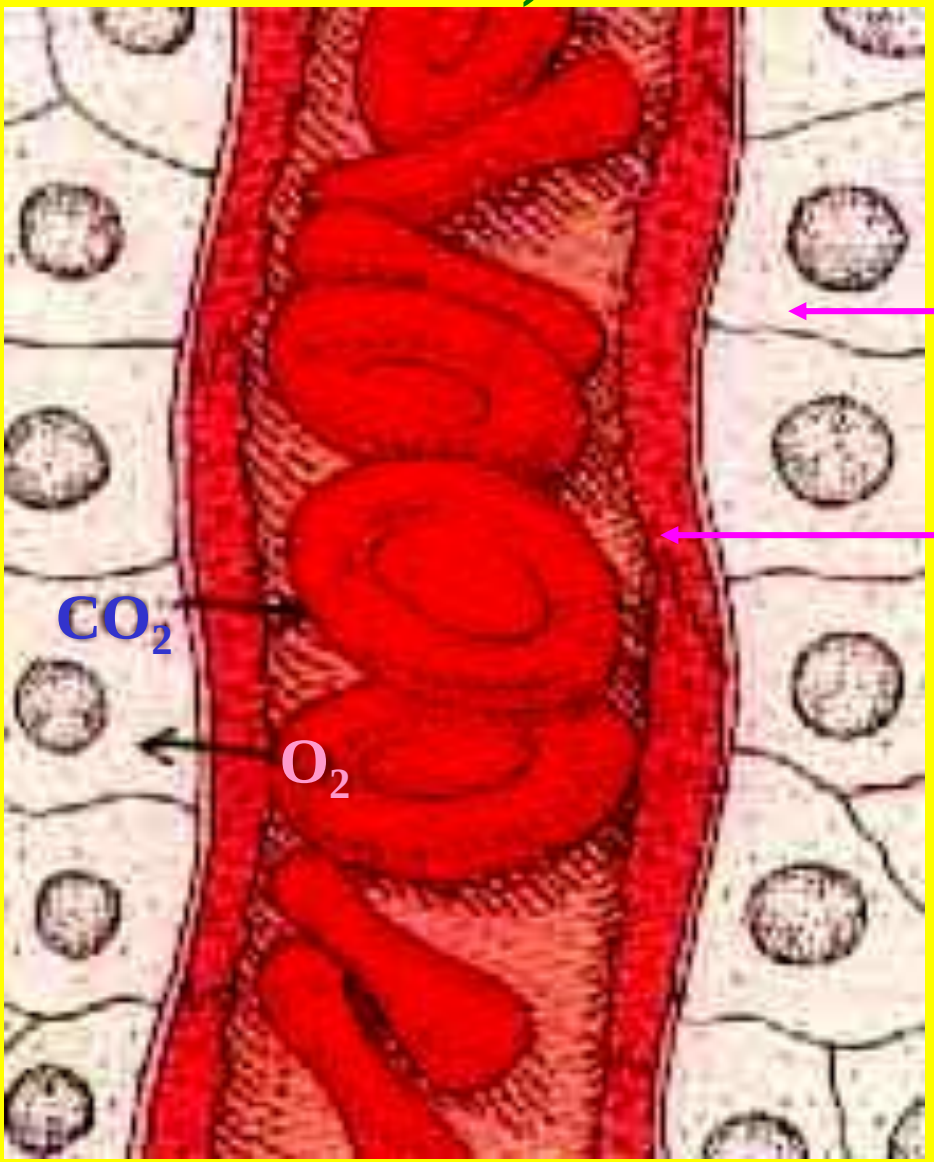
(a)External respiration (Body - Environment)



(b) Gaseous transport

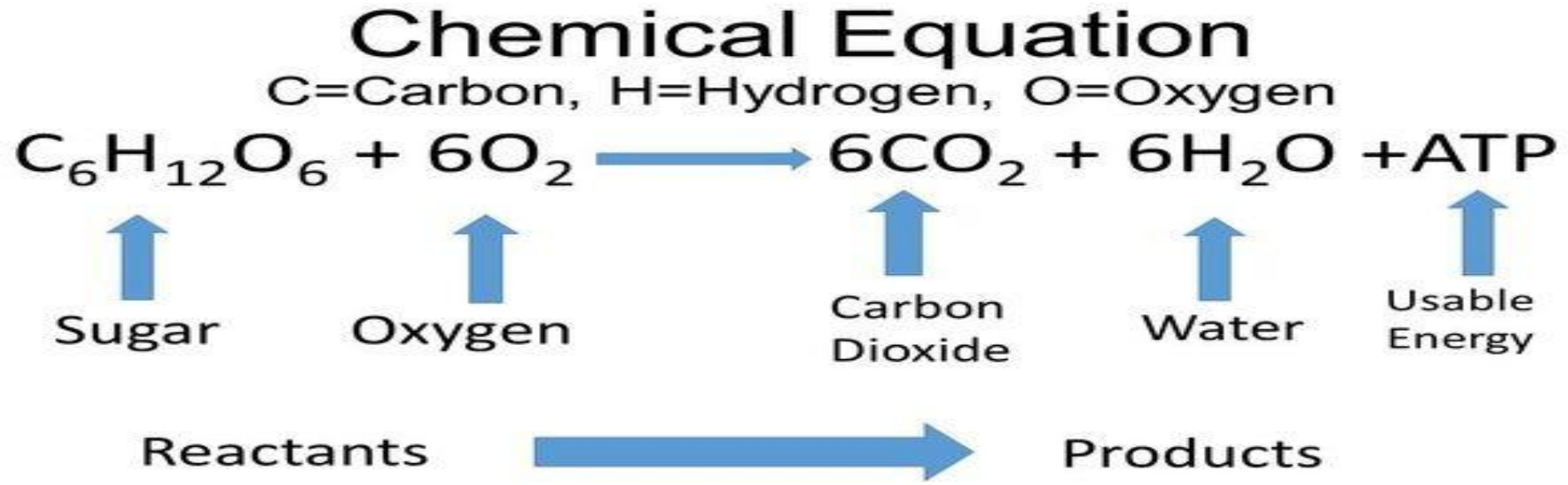
- Blood transports O_2 to body tissue &
- CO_2 from cells to respiratory organs.

(c)Internal respiration (Body tissue – Blood)



(d) Cellular respiration

- During which chemical degradation of food substances occurs within cells for obtaining Bioenergy from these.



Pulmonary respiration

- Mammals → only pulmonary breathing.
- Respiratory organs

  (a)location of lungs in thoracic cavities

  (b)presence of a nose

  (c)separation of nasal passage from buccopharyngeal cavity

  (d)elongated trachea

- External nares _located at the tip of nose
- The nostrils open into two long nasal cavities separated by nasal septum.

Each nasal cavity → Respiratory region
Each nasal cavity → Olfactory region

Lined with (1)skin containing hairs
(2)sweat glands
(3)sebaceous glands

❖Rest of nasal cavity is complicated due to scroll-like folded process called turbinals.

Turbinals

Nasal septum

lined with mucous membrane

pseudostratified columnar

cilia and globlet cells

(Ventral + Lateral) parts of nasal cavities

respiratory regions

- The dorsal part of mucous membrane over nasoturbinals contains olfactoreceptors.
- This is called Schneiderian membrane.
- Thus the dorsal part of each nasal cavity is olfactory.
- Posterior nares open into pharynx and from the respiratory tract starts at glottis.
- Glottis is covered with epiglottis and leads into larynx

Larynx

- located at the pharyngeal end of trachea
- has (1) a pair of small arytenoid cartilages along sides

  (2) a ring-like thick cricoid cartilage at the base

  (3) the anterior broadest thyroid cartilage covering ventral and lateral part of larynx.
- these cartilages form Adam's apple in neck region and from these also extends trachea.
- two pairs of vocal cords extend between arytenoids and thyroid cartilages.

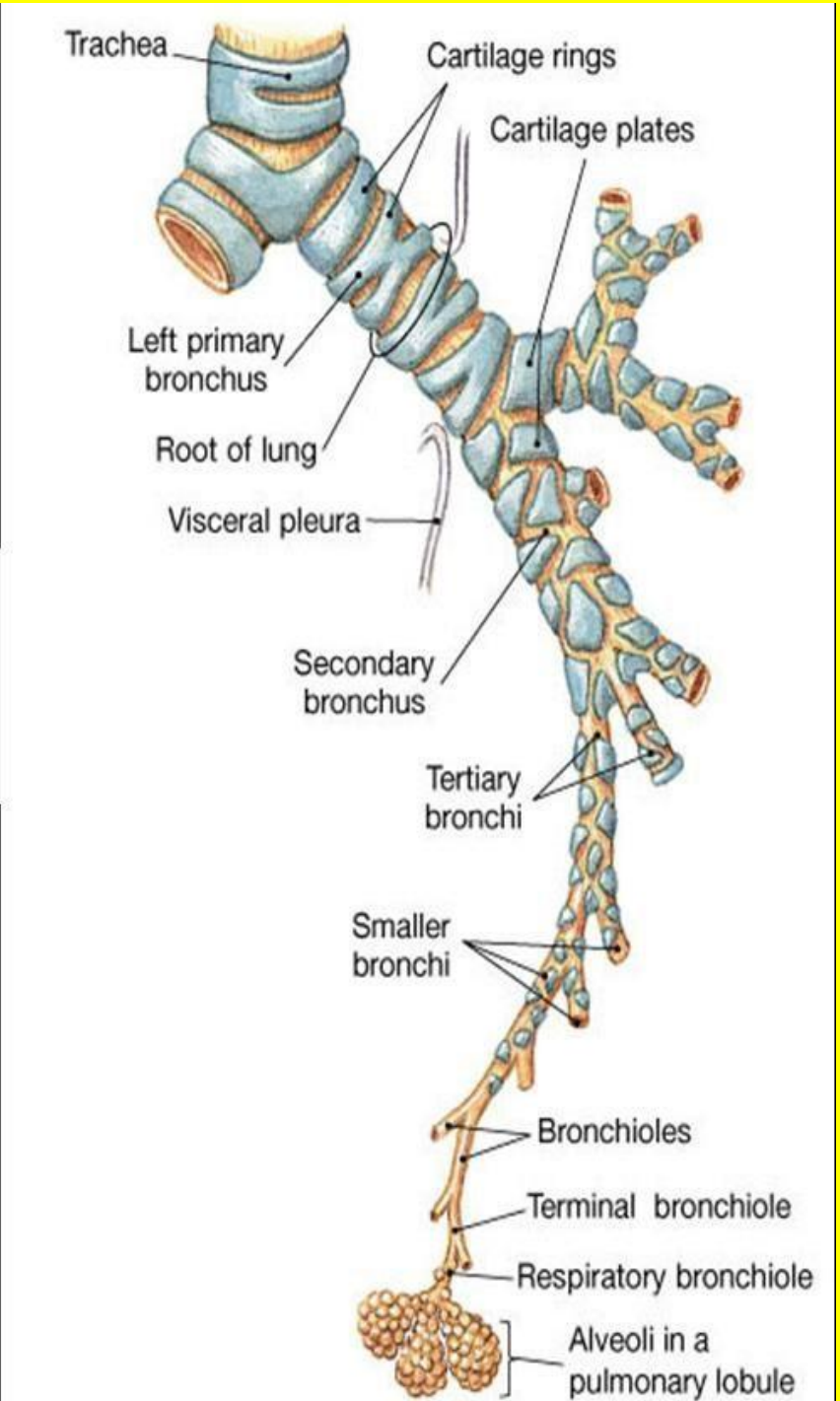
- anterior pair is false while posterior pair is true vocal cords.
- when air is expired from lungs , the posterior cords vibrate and produce sound.

Trachea

- a long tube running along the length of neck, ventral to esophagus and on entering thoracic cavity bifurcates into two bronchi.
- Each of these enters the lung of its side.

Lungs

- Lungs are soft, rosy, highly elastic spongy structures lying inside is a double layered fluid filled jacked of pleural membranes lining the thoracic cavity.
- These cavities are separated from abdominal cavities by a dome shaped diaphragm.
- The lungs are externally divided into lobes which are more in right lung.



Trachea and its several branches

- Trachea and its several branches entering into lung are known as bronchial tree .

Each primary bronchus

↓

secondary bronchi

↓

Tertiary bronchi

↓

Many bronchioles

↓

Respiratory bronchioles

↓

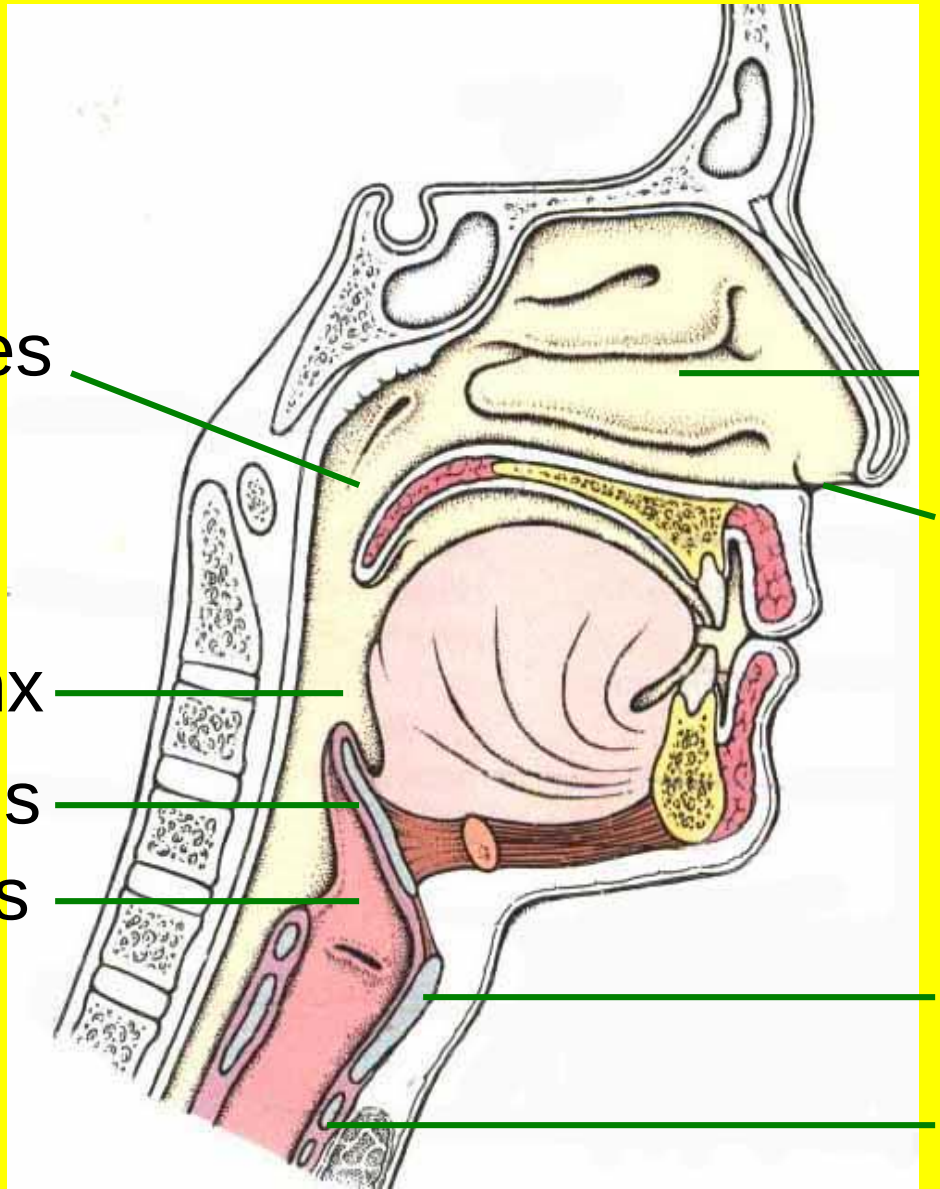
7 to 11 alveolar ducts

↓

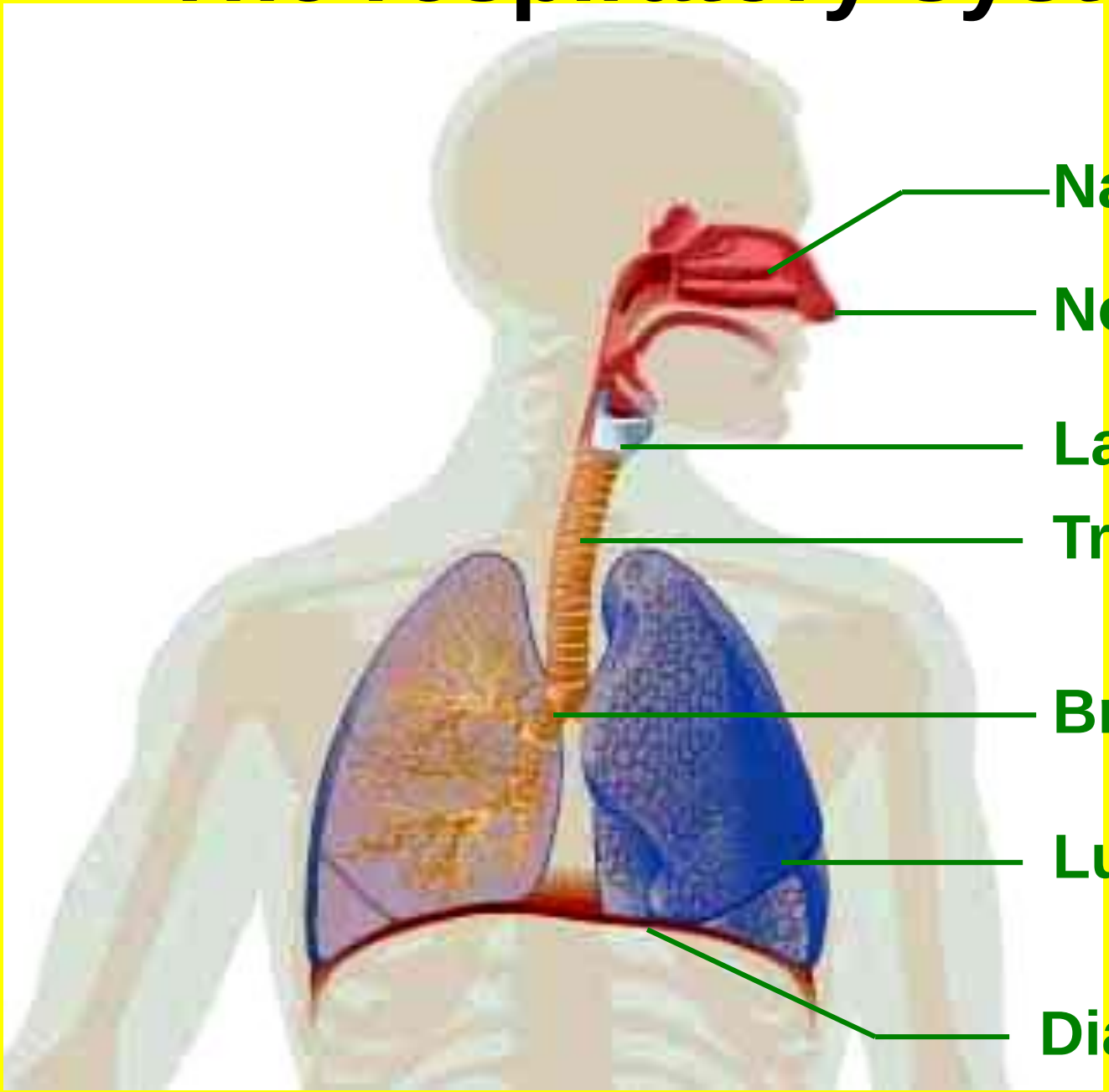
Few atria

- Each atrium terminates into alveoli.
- Trachea ,bronchi and branches up to tertiary bronchi bear cartilaginous rings which are incomplete in trachea but complete in later branches.
- All these branches are covered with ciliated pseudostratified columnar epithelium containing abundant goblet cells.
- The cilia constantly sweep mucous towards larynx to keep tubes clean.

Upper respiratory passage

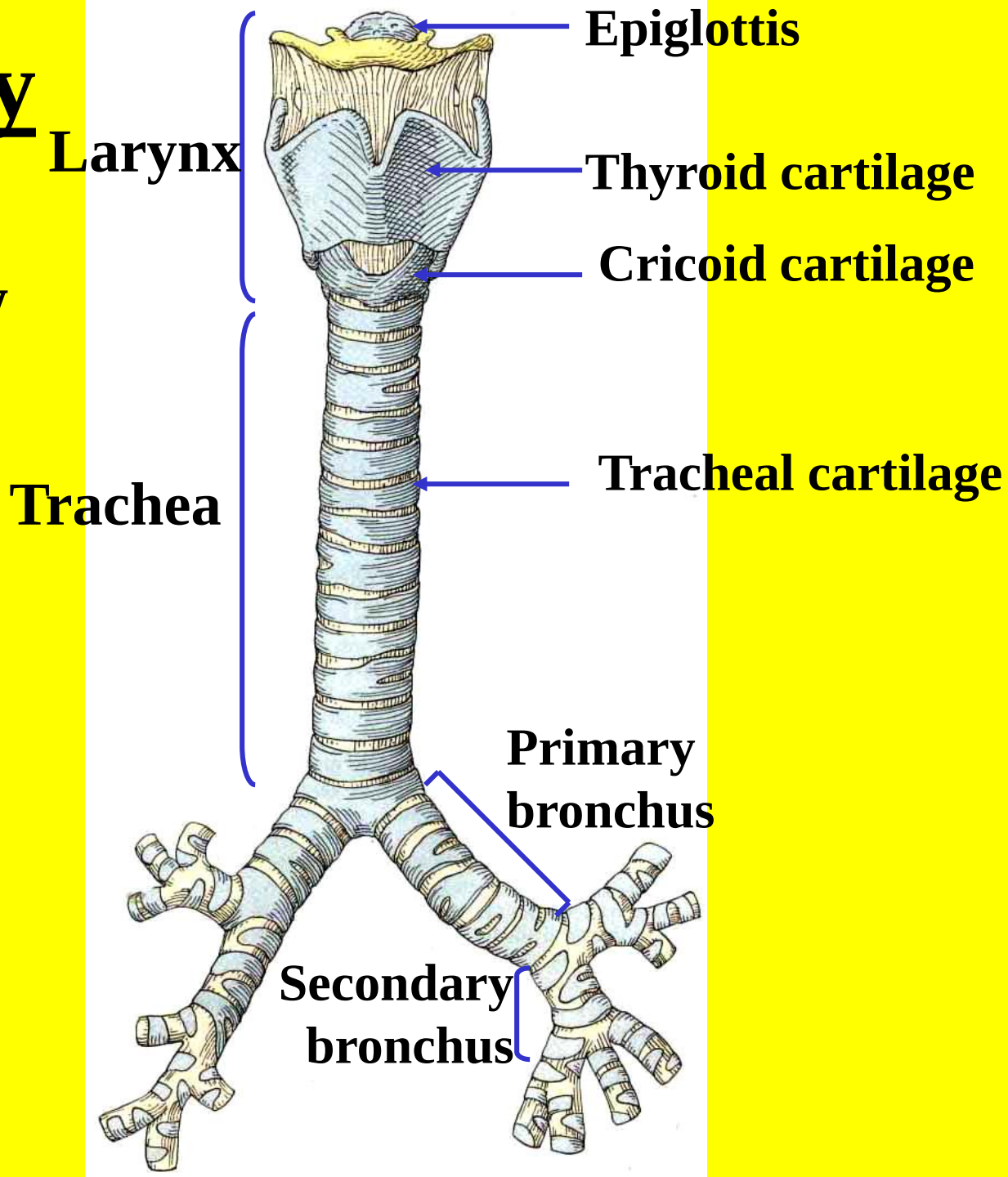


The respiratory system

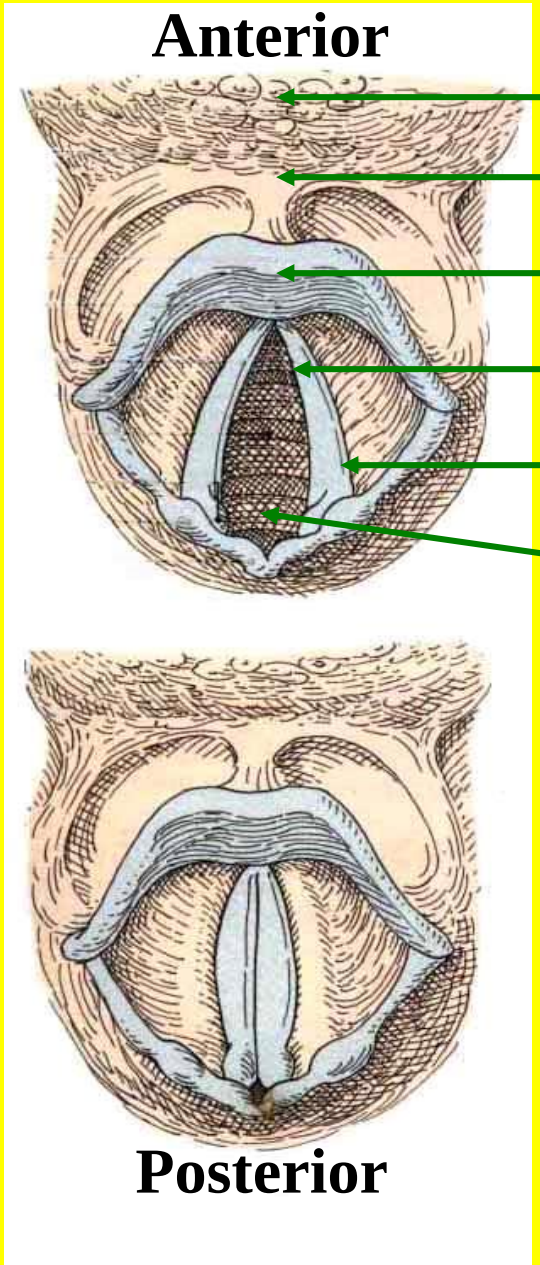


Respiratory tract

(Anterior view of the larynx, trachea & bronchi)



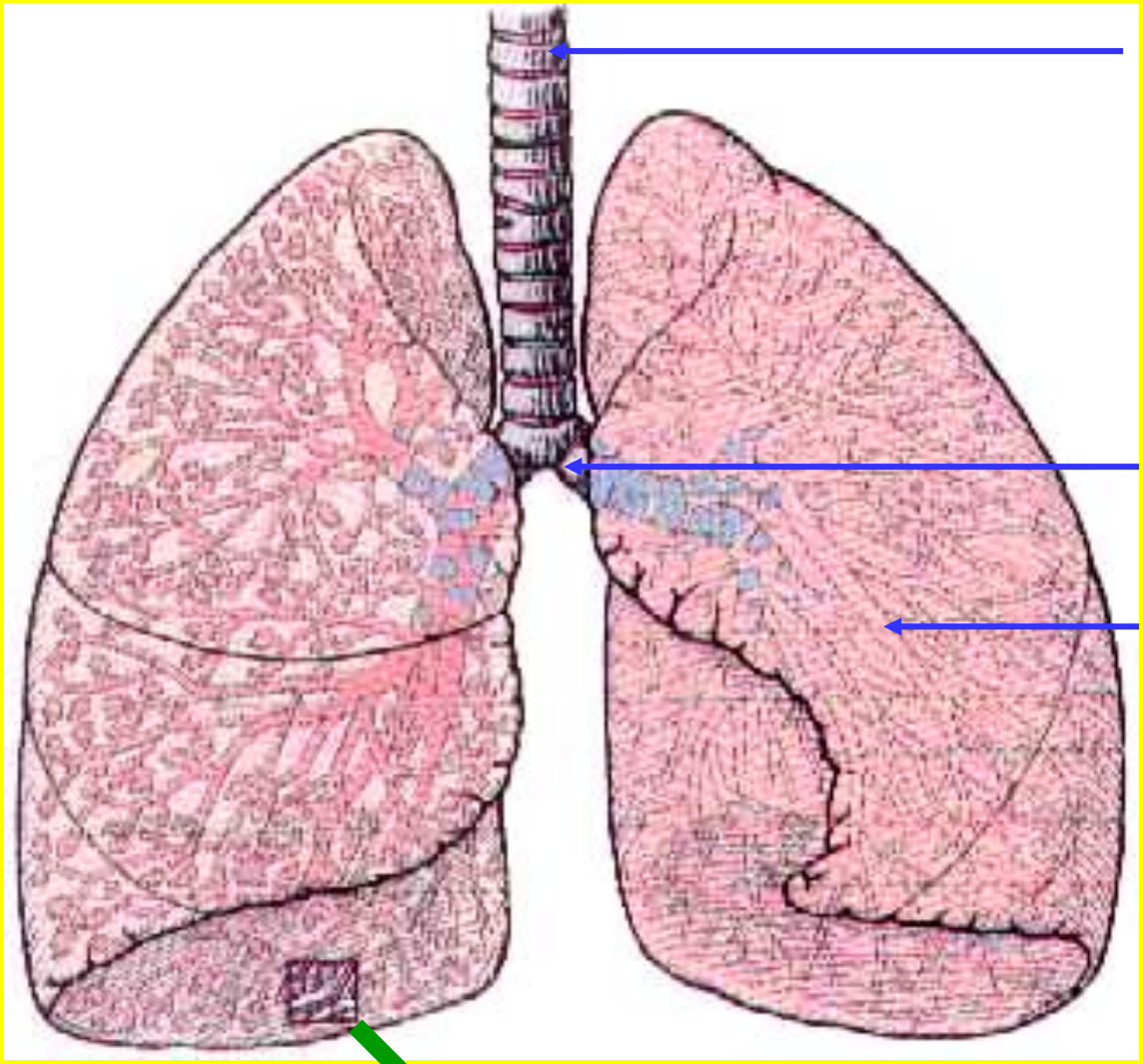
Surface views of the glottis open & close



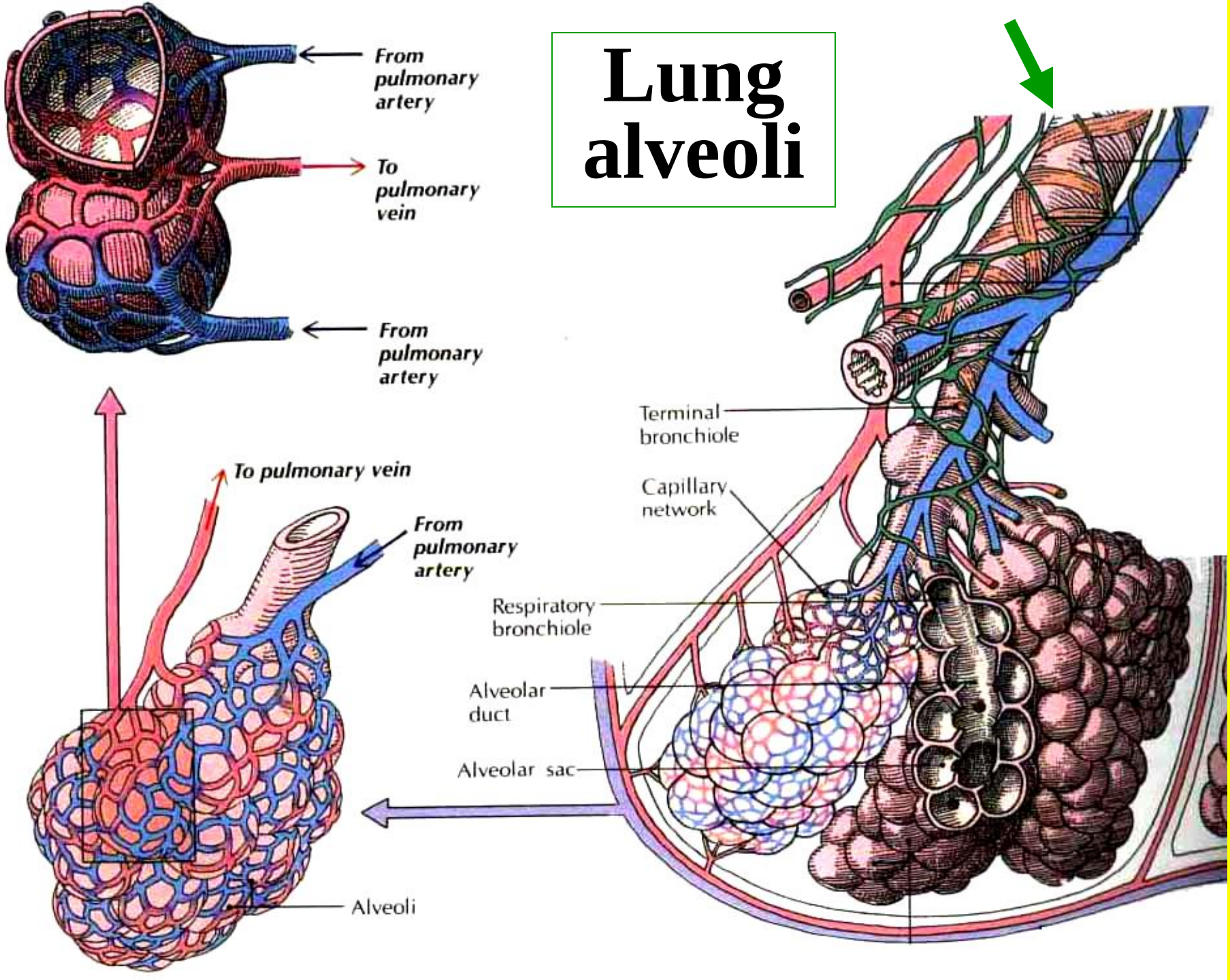
Open

Closed

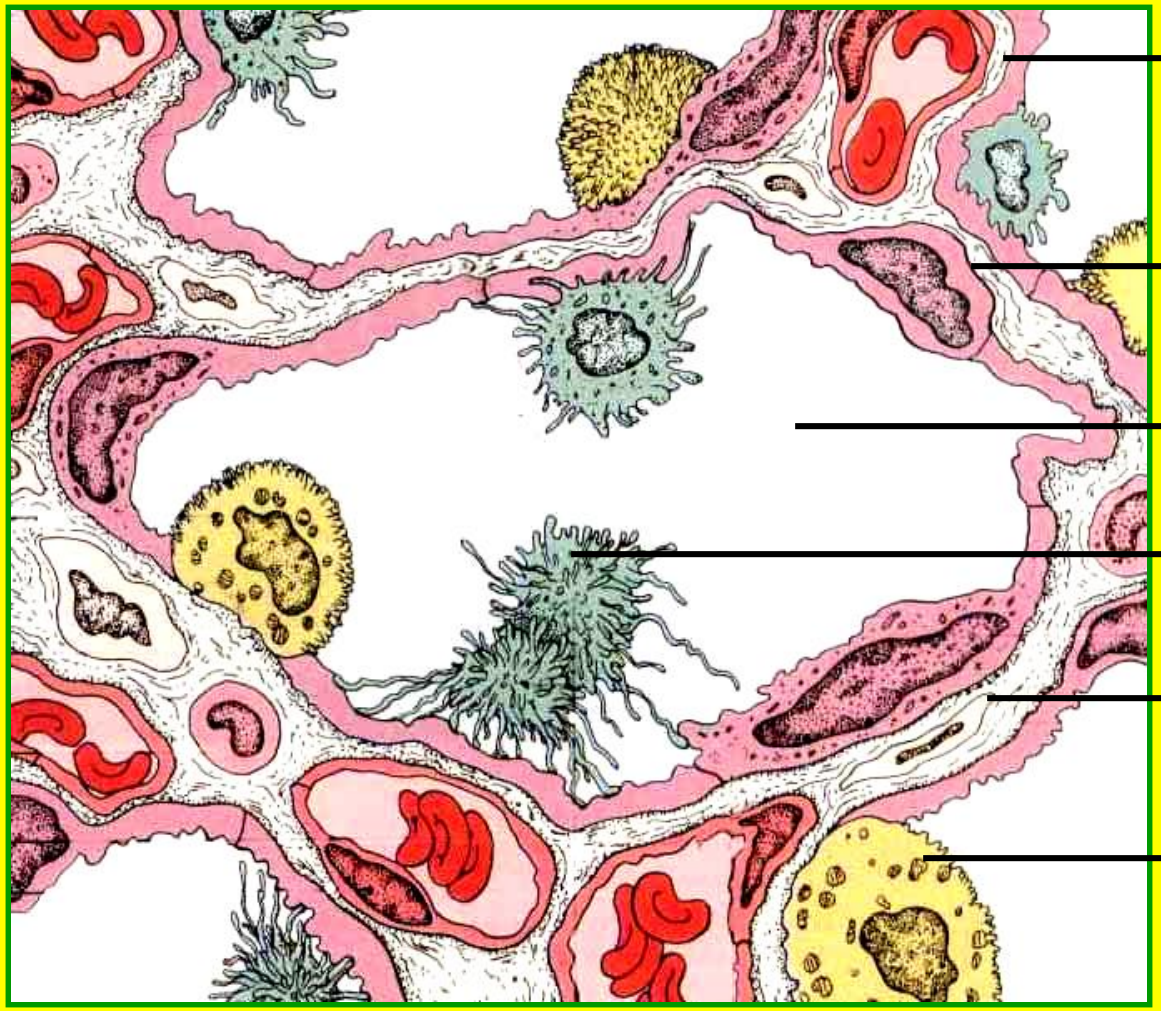
Mammalian lungs



Lung alveoli



A portion of lung tissue,
(showing an alveolus and surrounding capillaries)



Blood capillary (endothelium)

Alveolar epithelial cell **Type . I**

Alveoli

Macrophages

Connective tissue

Septal (surfactant cell) **Type . II**

Ventilation of lungs

Breathing at a fixed rate throughout the life.

The air going to be inspired is made

large sized bacteria, dust, particles, spores

get entangled in the hairs of nasal chambers,

its temperature is brought to the level of body temperature by mucus &blood supply of the wall.

During inspiration

↓

diaphragm flattens

↓

anterior inter costals pull the ribs forward & raise the sternum

↓

increase volume of thoracic cavities

↓

the lungs get stretched

↓

alveoli are distended

↓

the pressure of air in alveoli → (-1 to -3 mmHg)

air is sucked into alveoli via conducting part of respiratory system.

Inspiration

Expiration