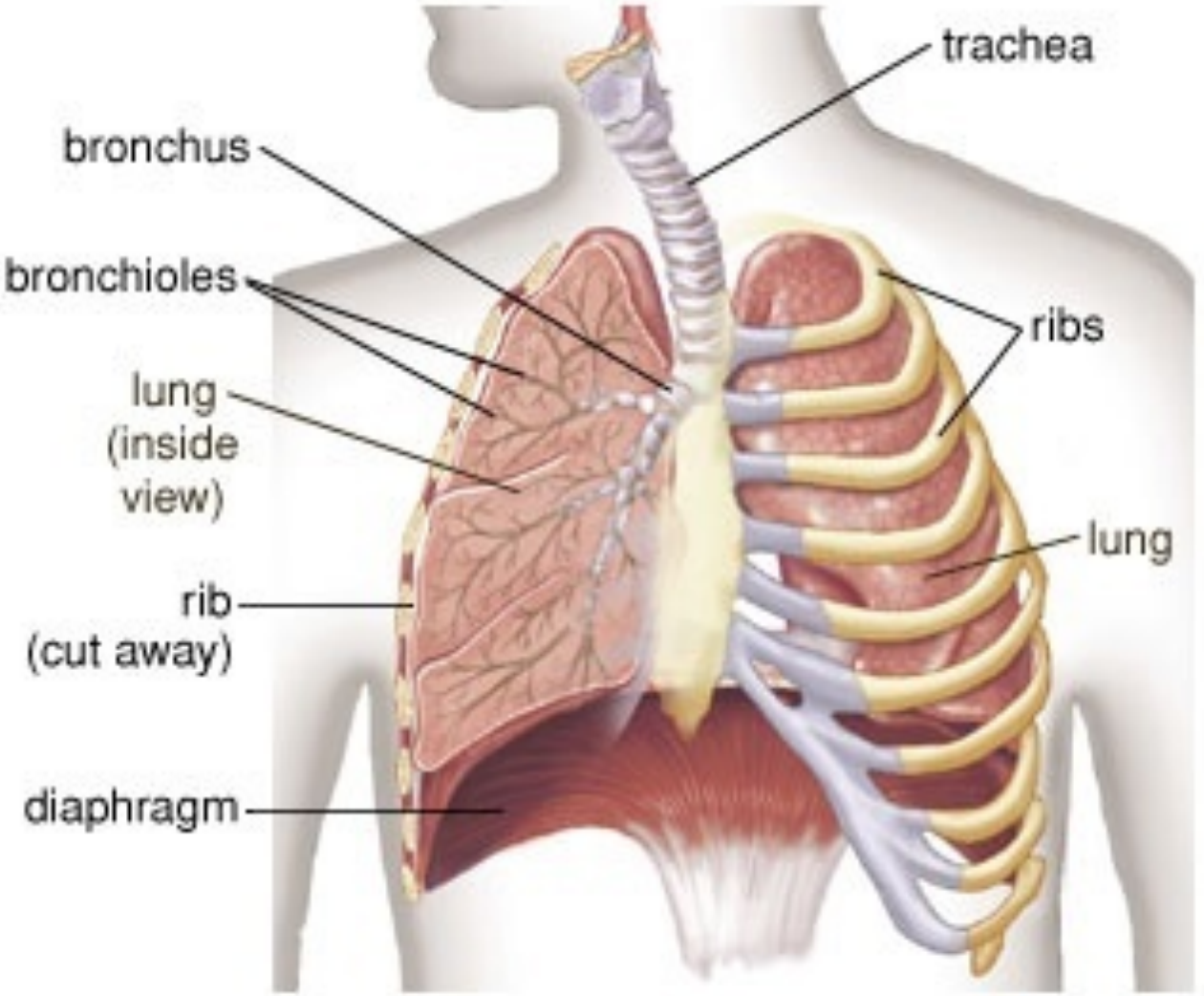
# The Human Respiratory System



# Functions of the Respiratory System

- Circulatory system delivers the food that is broken down by digestive system to the cells
- **Metabolism** is when the energy in food is released by cells in the presence of oxygen ($O_2$)
- The respiratory system is needed to bring $O_2$ into the body and excretes $CO_2$ (the by-product of cell metabolism)

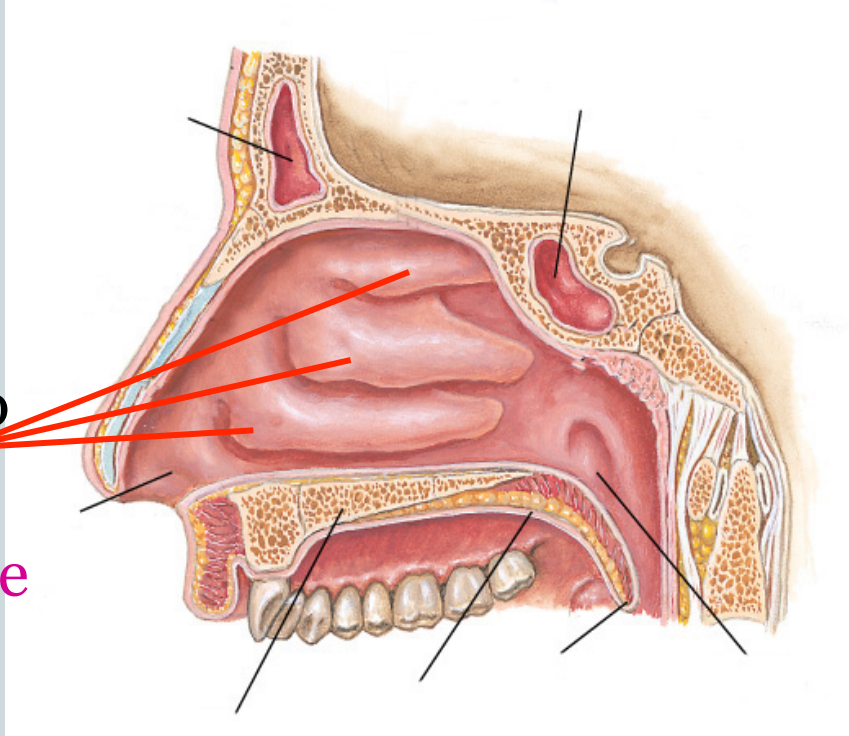
# The air we breathe

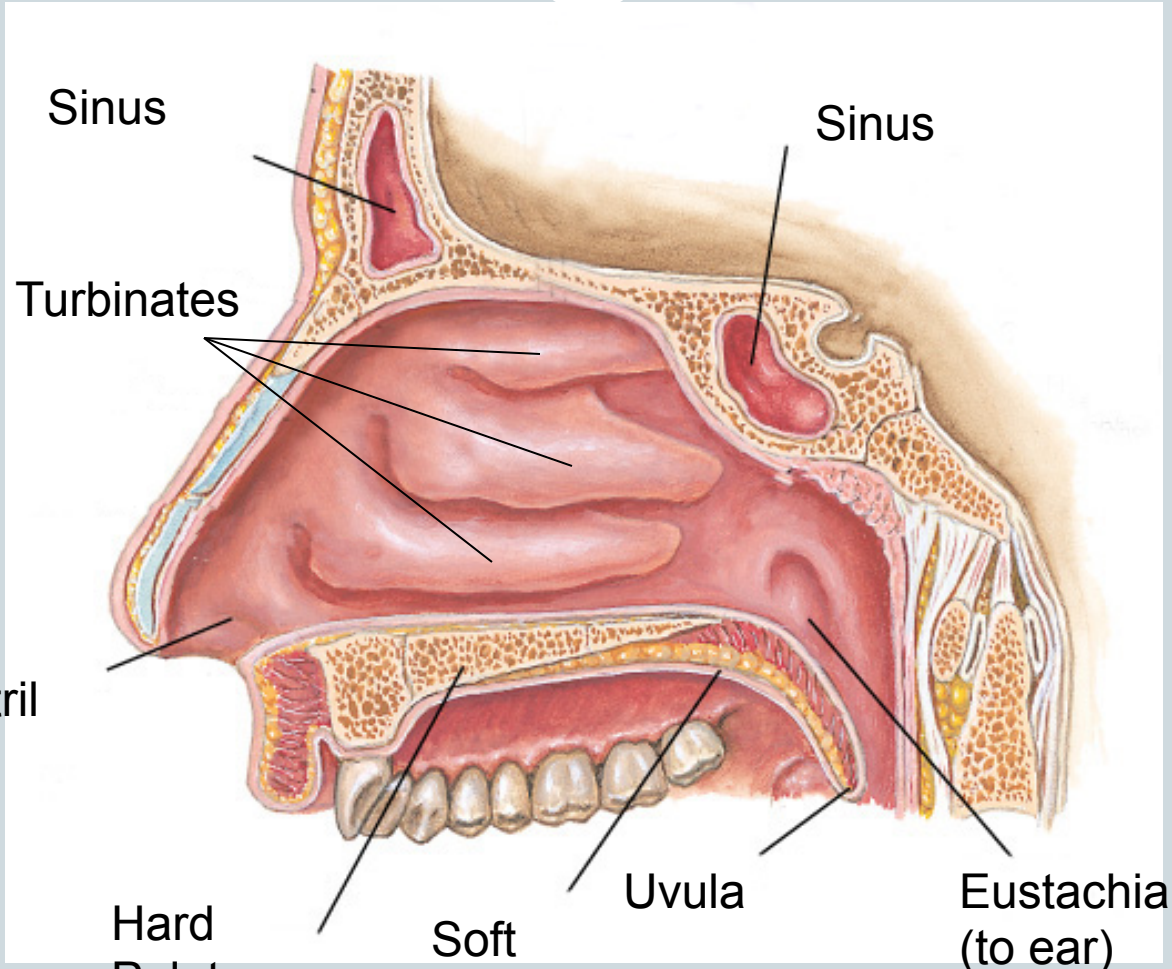
- The air we inhale is :
  - Nitrogen (N) 78%
  - Oxygen (O2) 21%
  - Carbon Dioxide 0.04%
  - Other gases < 1%
- The air we exhale is:
  - Nitrogen 78%
  - Oxygen 16%
  - Carbon Dioxide 5%
  - Other <1%

# Parts of the Respiratory System

# The Nasal Cavities

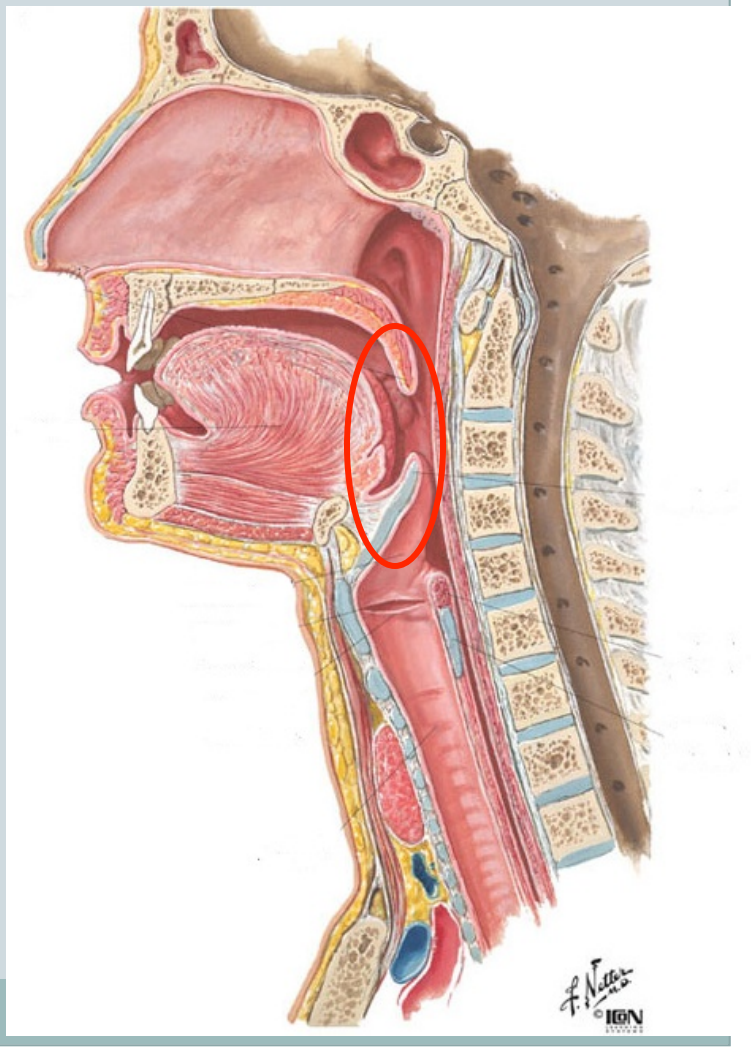
- The nasal cavities have 3 functions:
  - **Filtering**- **cilia** (microscopic hairs) trap dirt.
  - **Warming**- **turbinates** (ridges in cavity) increase surface area to warm air.
  - **Humidify**- mucus adds moisture to the air



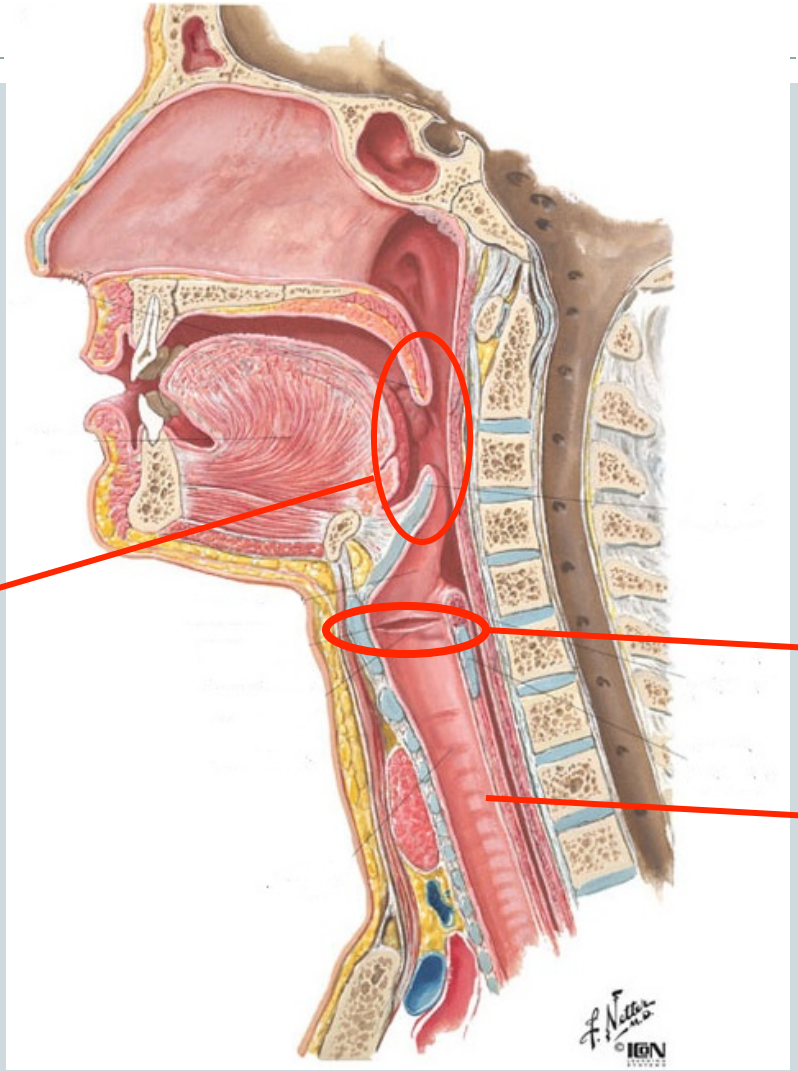

Sinus
Sinus
Turbinates
Nostril
Hard Palate
Soft Palate
Uvula
Eustachian tube (to ear)

# The Pharynx

- Found at back of the mouth
- Used by both the digestive and respiratory system for the passage of food or air.



Pharynx

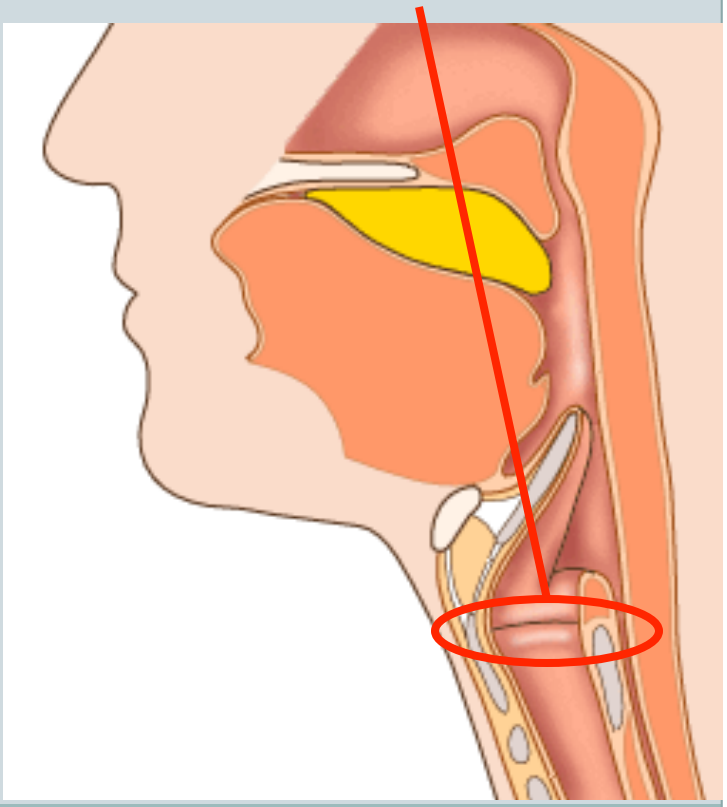


Larynx

Trachea

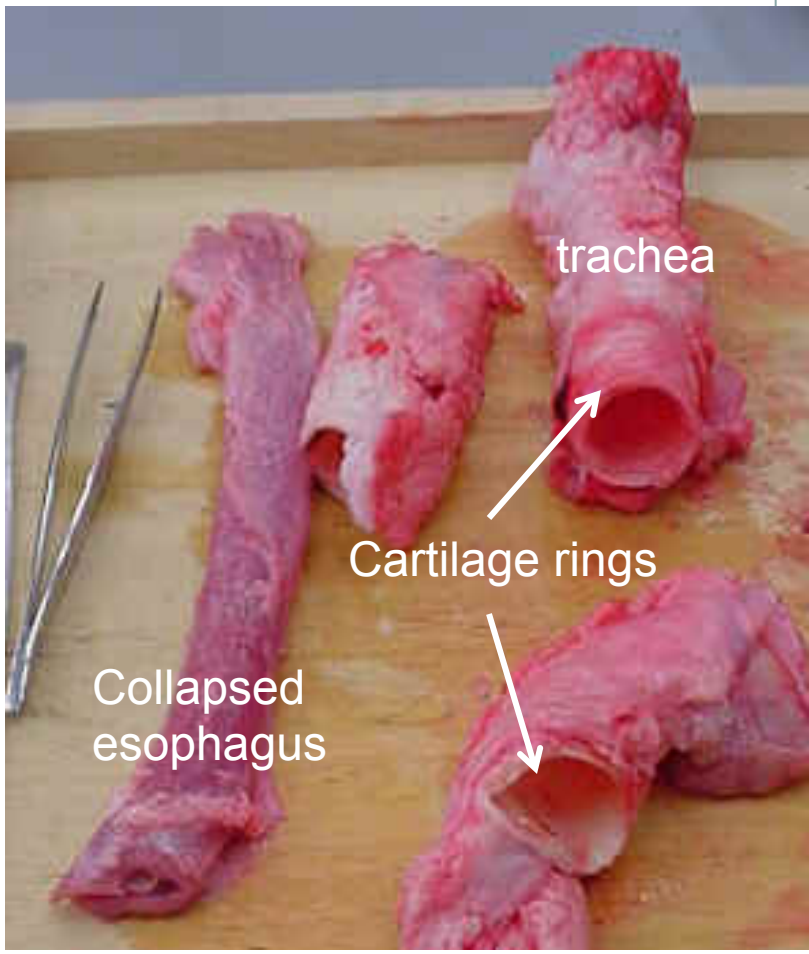
# **Larynx** (voice box)

- Made mainly of cartilage
- The larynx contains the vocal cords that vibrate when air is forced through
- The epiglottis closes when food is swallowed blocking the airway (no sound)



# Trachea

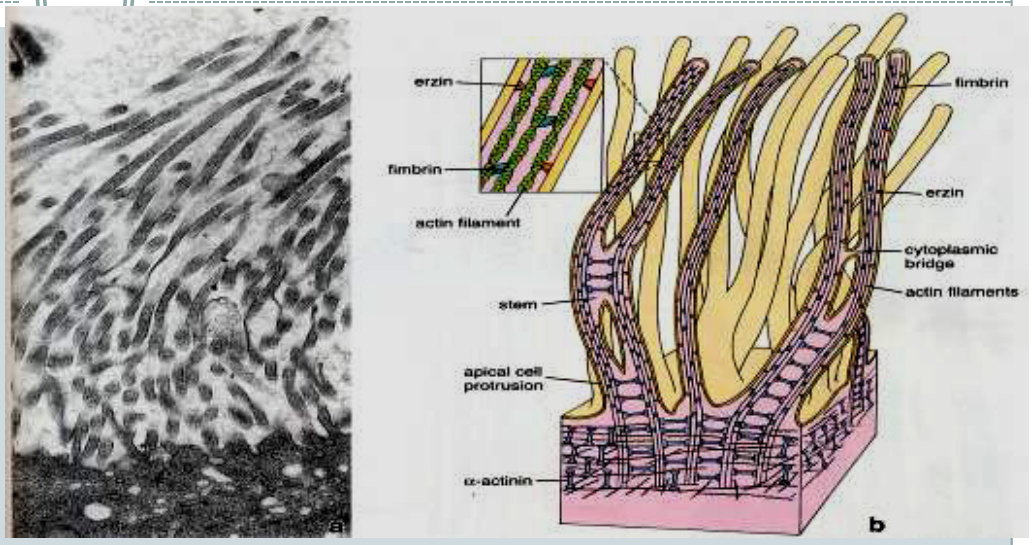
- The **trachea** connects the larynx to the bronchi
- It has cartilage rings that keep it rigid and keep it from collapsing.

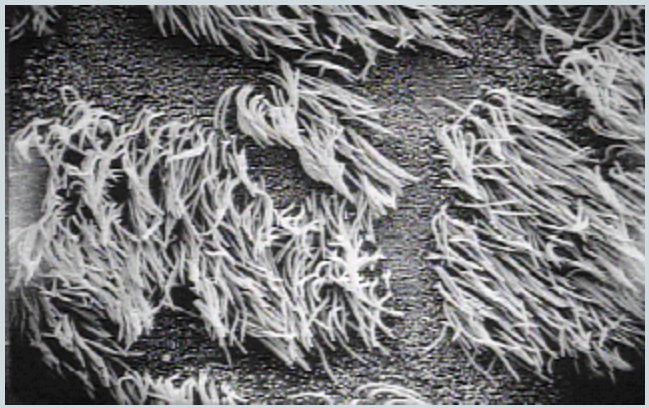


# Cilia in the Trachea

- Cilia are hair-like projections that line the trachea

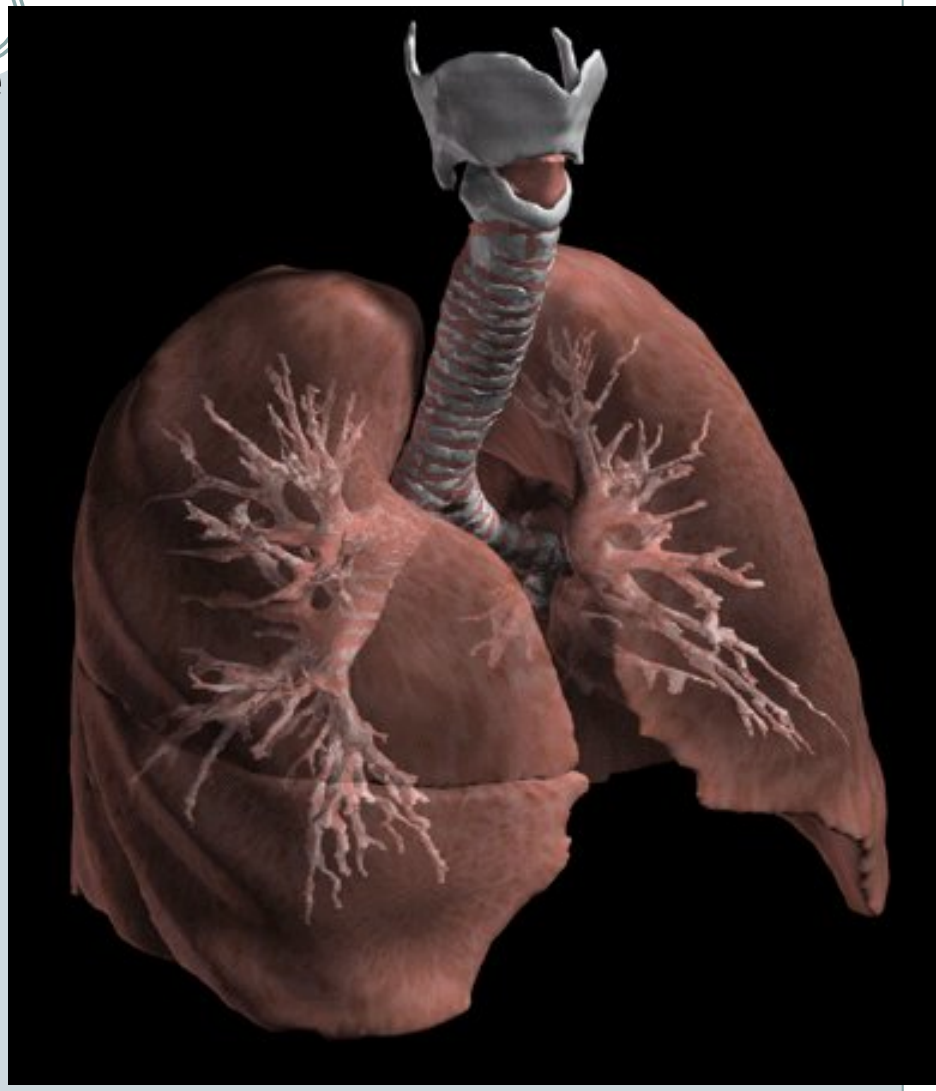
- They sweep dirt and mucus out of the lungs



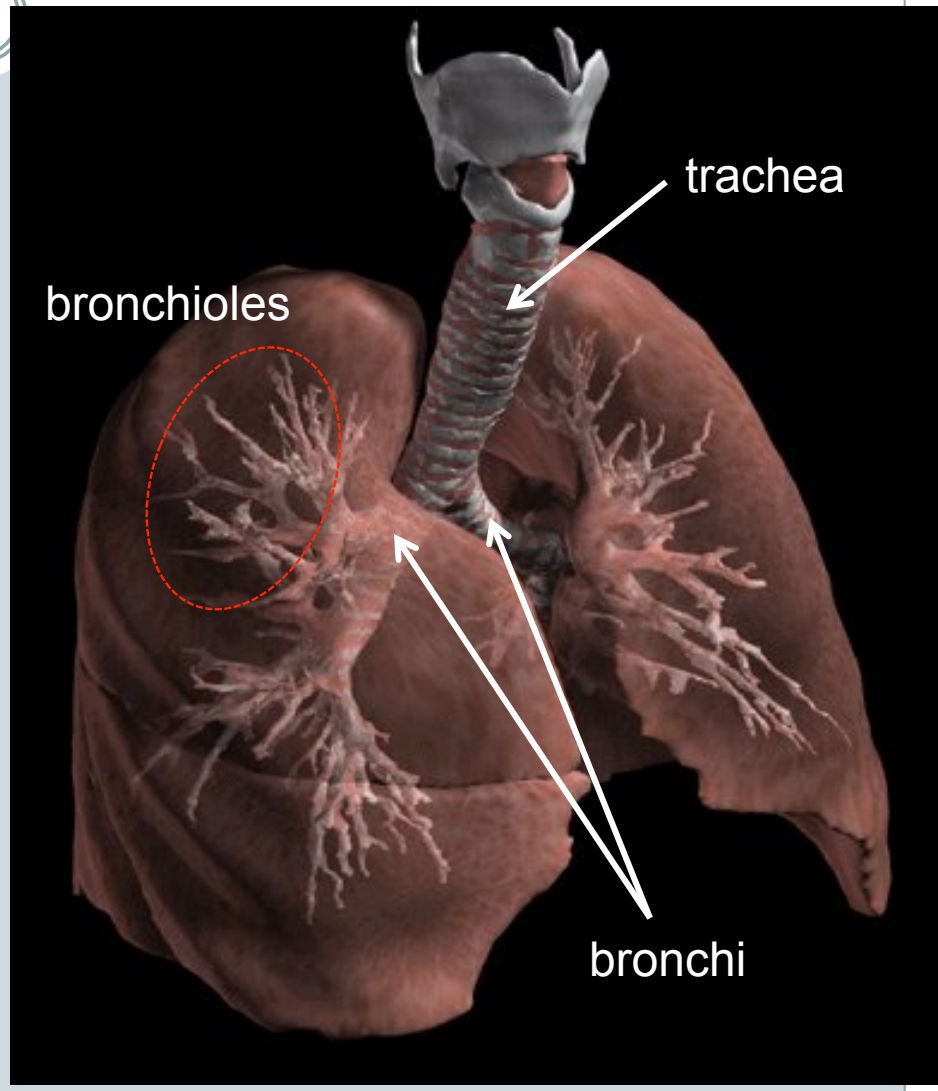
# The lungs

- There are 2 lungs which are not identical.
- The left side is smaller to make room for the heart



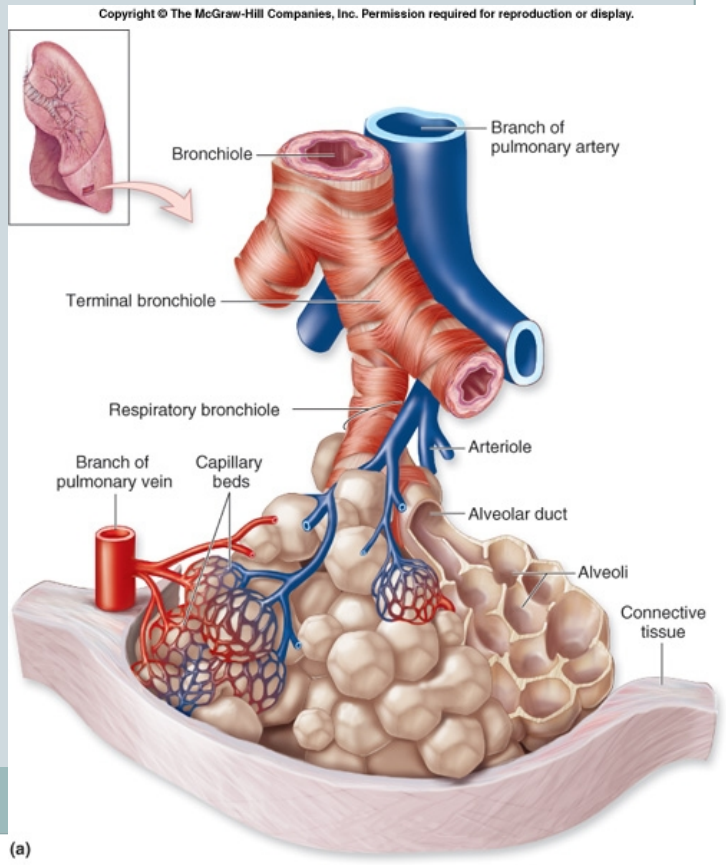
# Bronchi Tubes and Bronchiole

- The trachea splits up into two **bronchi** tubes.
- The bronchi tubes split up, like tree branches, and get smaller and smaller inside the lungs to form the **bronchiole**.



# Bronchi Tubes and Bronchiole

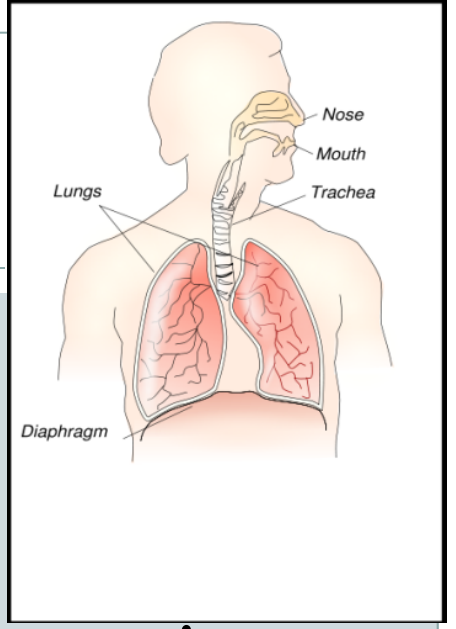
- The bronchiole keep getting smaller and smaller until they finally end with small air sacs called **alveoli**.



# Alveoli

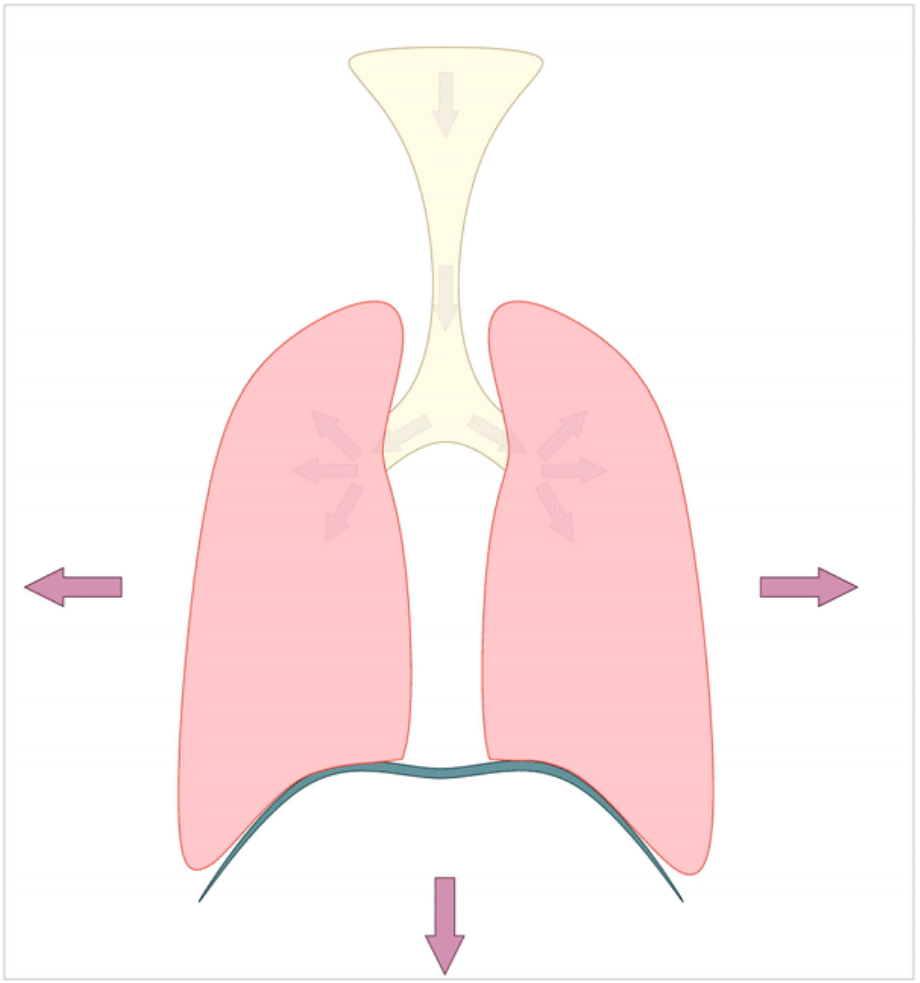
- The alveoli fill up with air/oxygen when you breath in.
- They are surrounded by many tiny blood vessels called **capillaries**.
- The walls of your alveoli (and capillaries) are so thin that the oxygen or carbon dioxide can pass through them, traveling right into, or out of your blood stream.

# Diaphragm




- The **diaphragm** is a sheet of muscle extending across the bottom of the rib cage
- When it contracts in lowers into the abdomen, it lowers the pressure in the lungs to suck in air
- When it relaxes, it rises back up under the ribs and the air is forced out of the lungs (also due to a change in pressure)

# Respiration Animation



Volume

Low High

Pressure

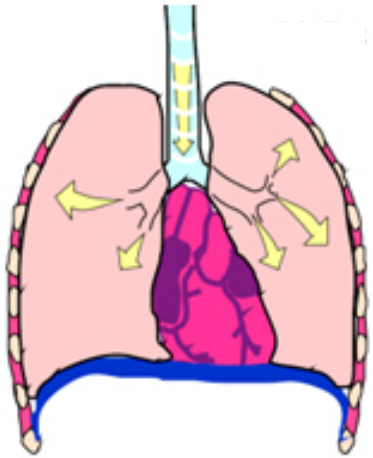
Low High

Date _____

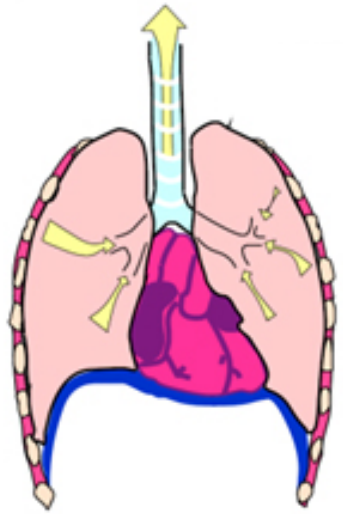
# THE RESPIRATORY SYSTEM

## Breathing

We are able to breathe in and out because of differences in air pressure. The pictures below illustrate inhaling and exhaling. Describe what is happening next to each illustration.



| | |
|---|---|
| Ribs & sternum | |
| Diaphragm | |
| Volume of thoracic cavity and lungs | |
| Air pressure in lungs | |
| Displacement of air | |



| | |
|---|---|
| Ribs & sternum | |
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| Volume of thoracic cavity and lungs | |
| Air pressure in lungs | |
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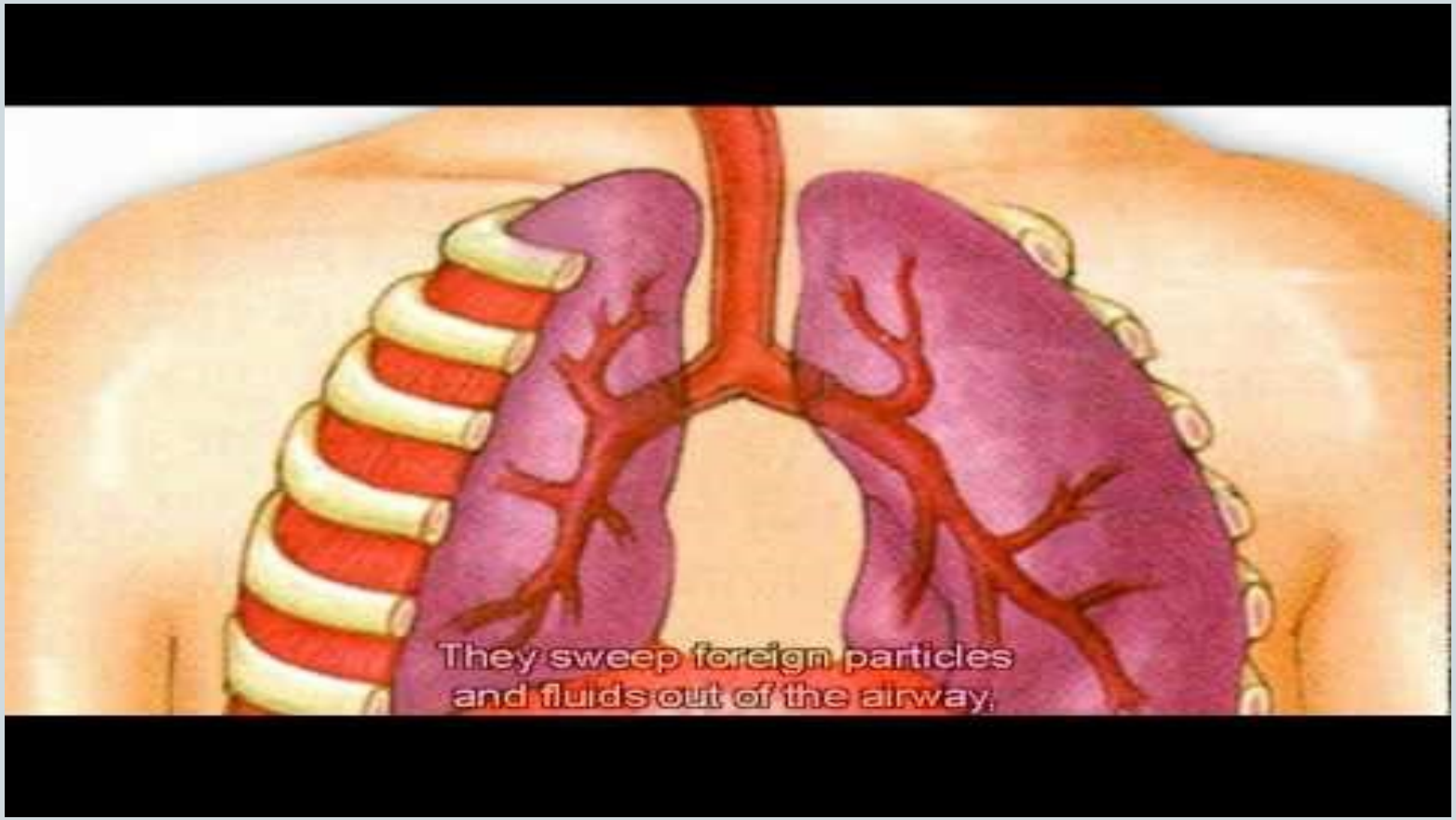
# How Respiration Works



# Gas Exchange- Inhale

- While inhaling, the alveoli are filled with air.
- As the lungs are higher in oxygen concentration than in the blood, the oxygen **diffuses** (a movement of particles) through the alveolar membrane into the blood and attaches to the red blood cells (RBC's).

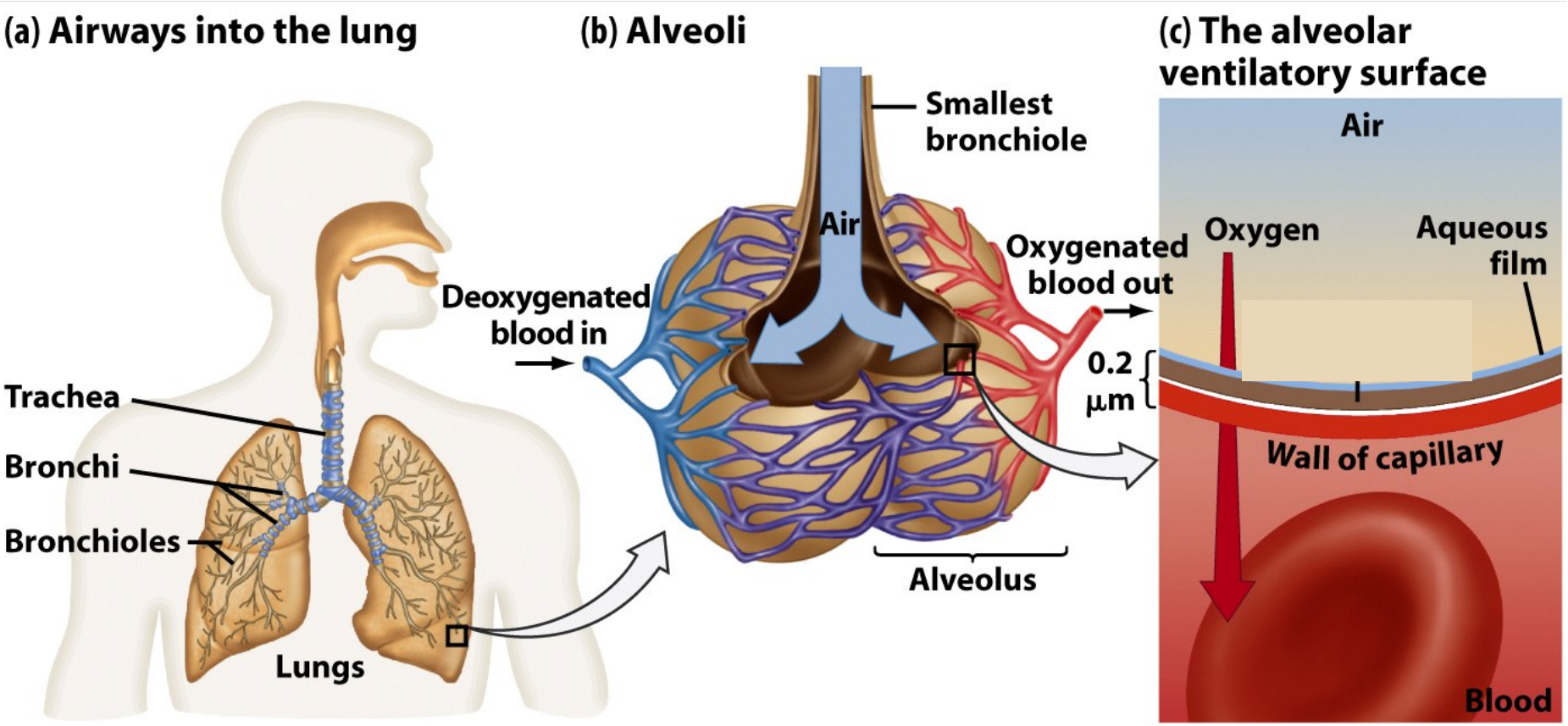
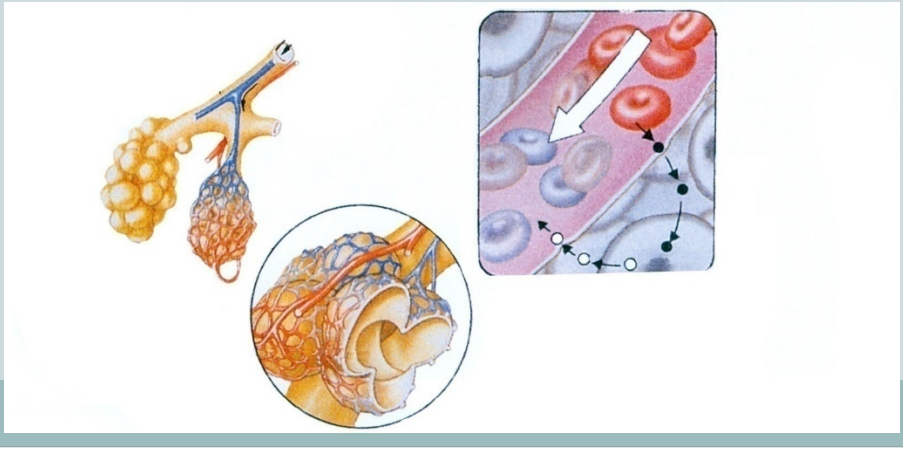
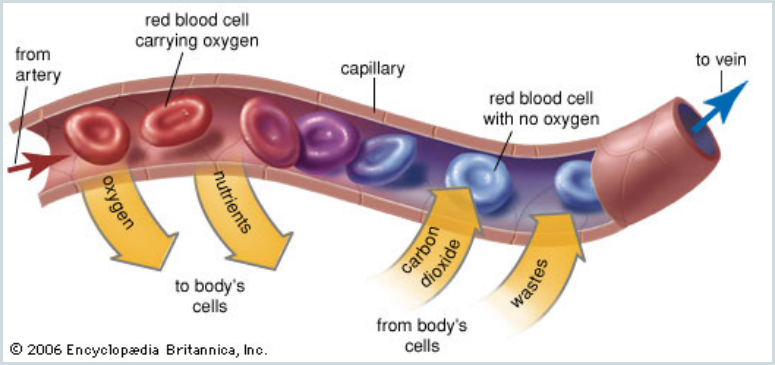



Figure 44-8 Biological Science, 2/e

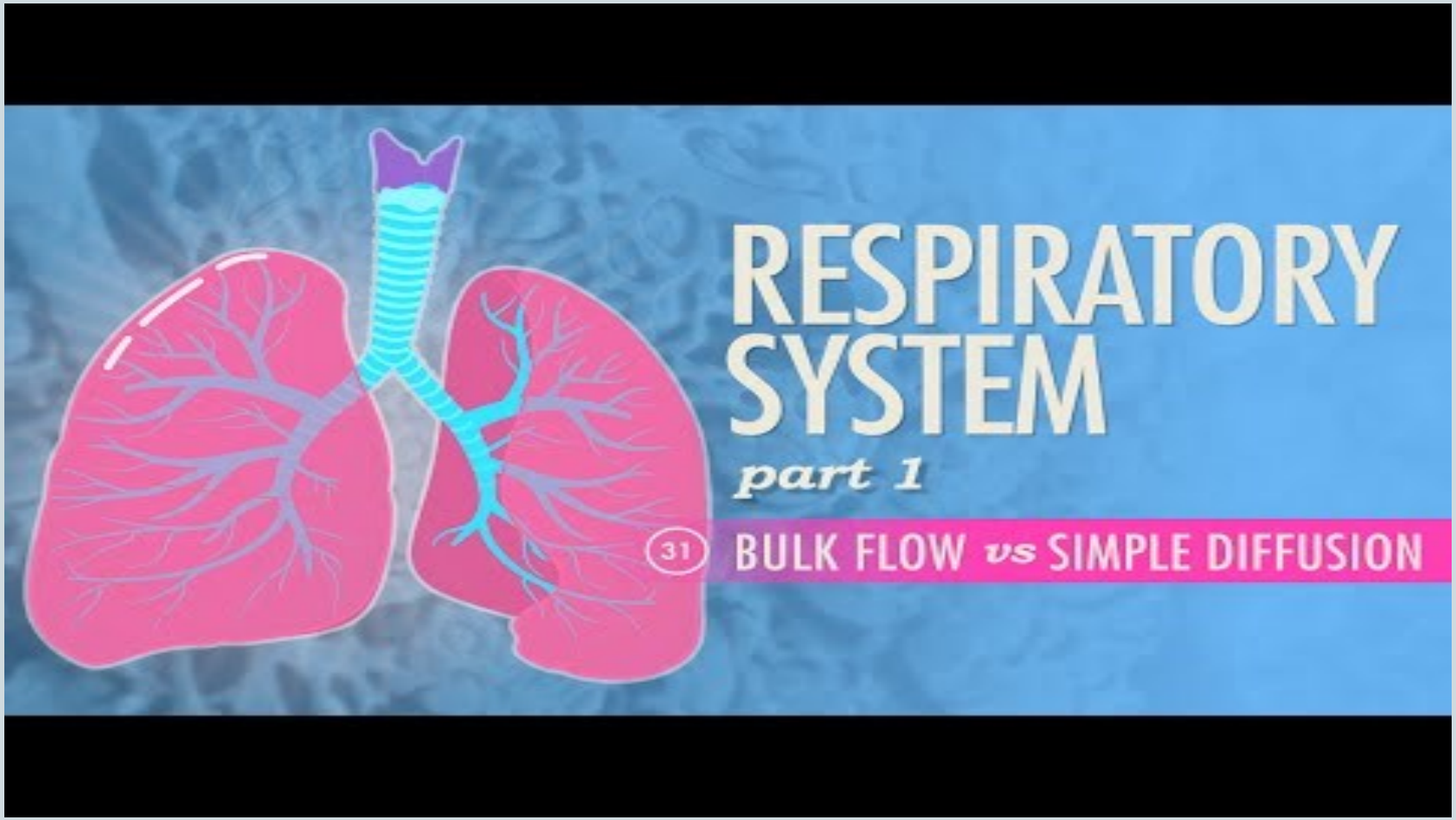
# Gas Exchange- Exhale

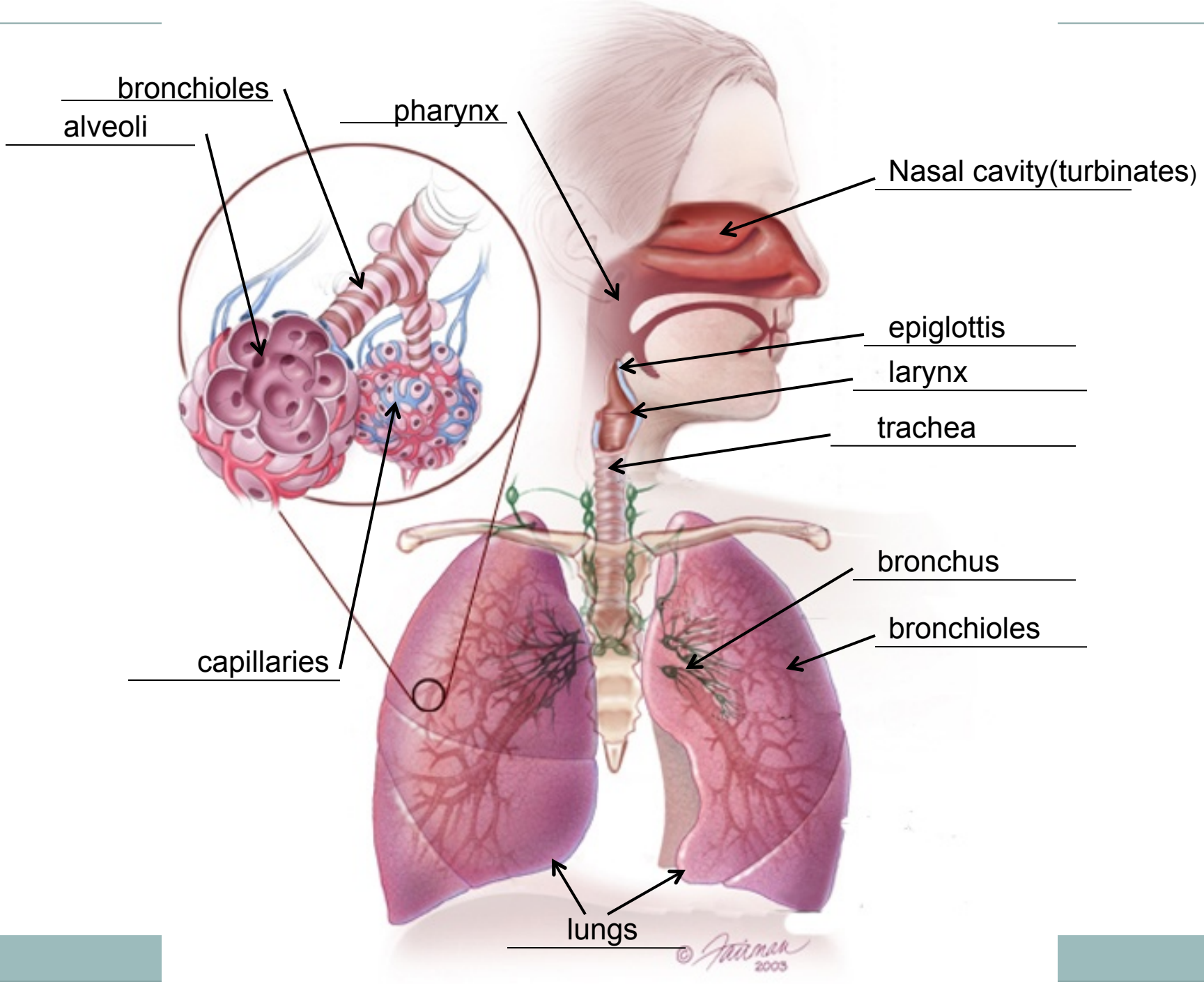
- When the blood has a higher carbon dioxide concentration than the lungs, the carbon dioxide diffuses through the alveolar membrane into the lungs where it is **excreted** (process of eliminating waste) as we exhale.





# How our Respiratory System Evolved




bronchioles
alveoli
pharynx
Nasal cavity(turbinates)
epiglottis
larynx
trachea
bronchus
bronchioles
capillaries
lungs

# Quiz time!

CAN YOU LABEL ALL OF THE PARTS?