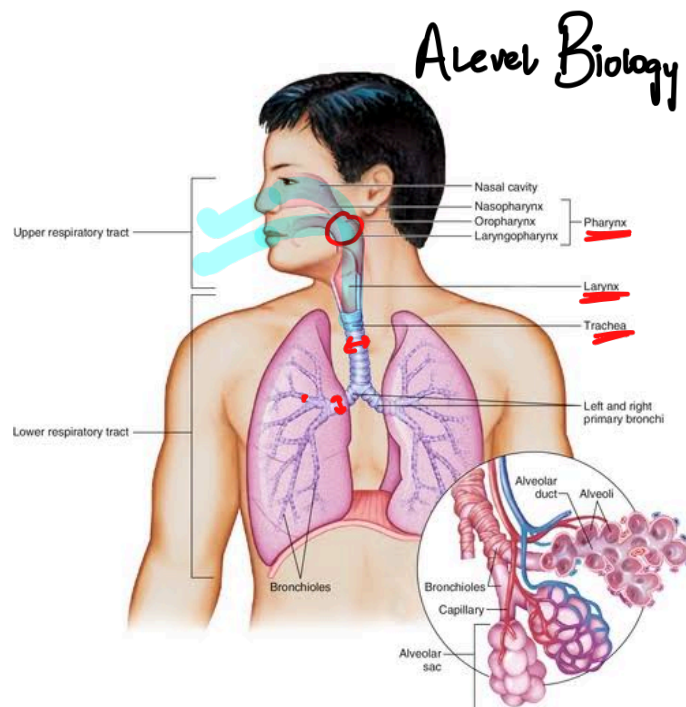
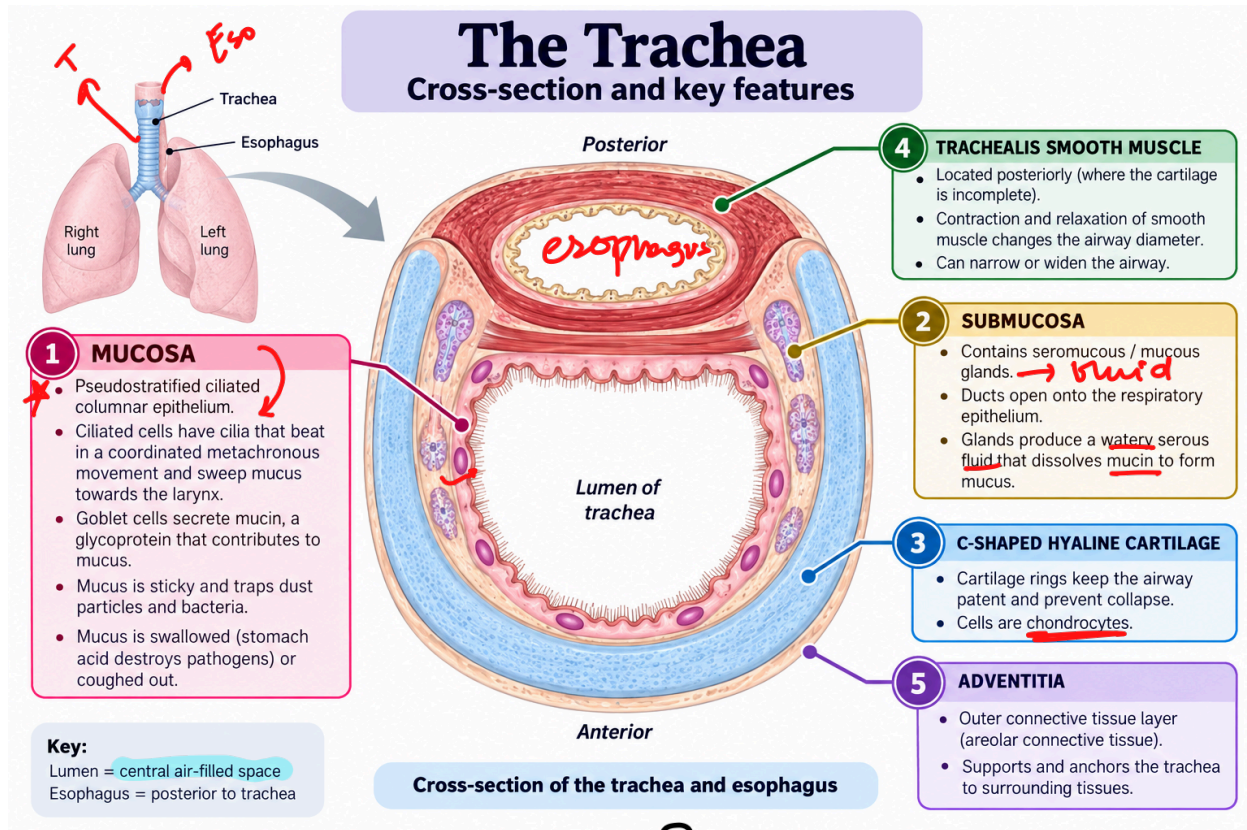


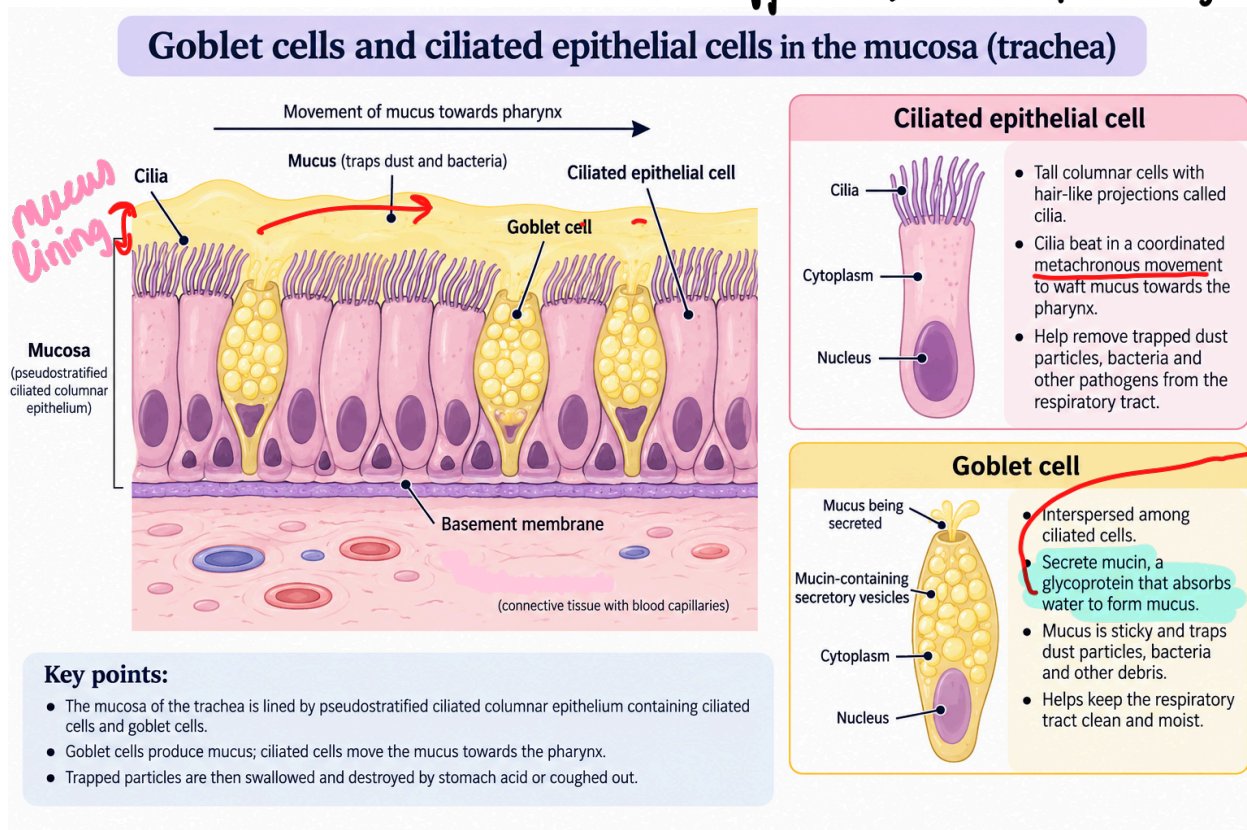
AS Biology 9700 • Gas Exchange

Structure	Key features / function
Trachea	Main airway; supported by cartilage to prevent collapse
Bronchi	Two branches from trachea; carry air into each lung; contain cartilage and smooth muscle
Bronchioles	Smaller branches of bronchi; contain smooth muscle to regulate airflow
Alveoli	Tiny air sacs; main site of gas exchange
Capillary network	Dense network surrounding alveoli; carries blood for gas exchange

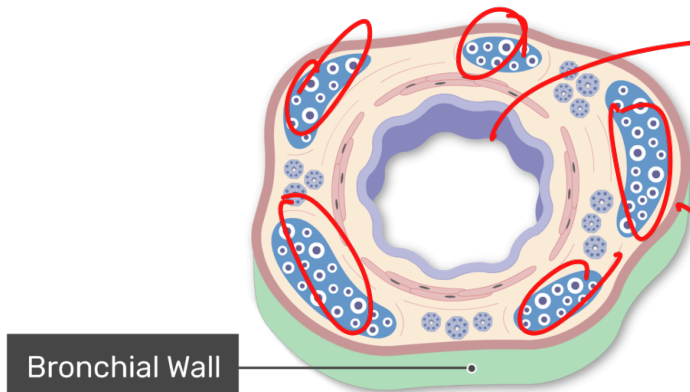




Alevel Biology (9700) with Ms Zuha Fatima

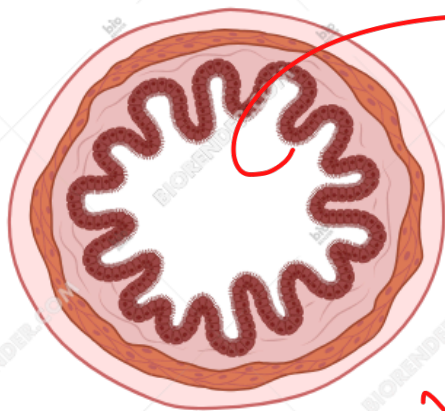


Bronchus: ① Mucosa
 → pseudostratified ciliated
 columnar epithelium



→ cartilage

Bronchiole
 → smooth muscles



→ pseudostratified ciliated
 columnar
 epithelium
 X goblet cells
 (no thick mucus
 layer is formed)

X cartilage

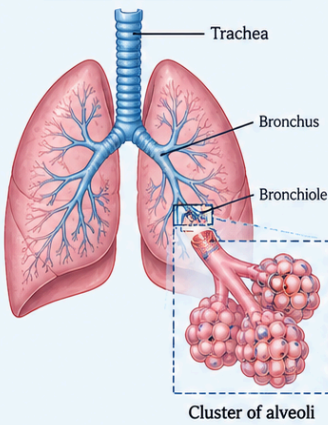
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Comparison of Features in the Trachea, Bronchi and Bronchioles

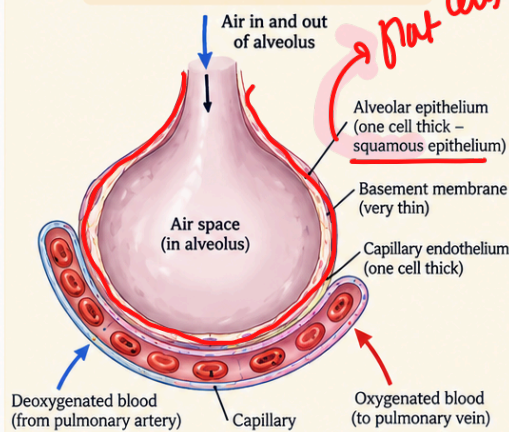
Features	Trachea	Bronchi	Bronchioles
1. Pseudostratified ciliated columnar epithelium	✓	✓	✓
2. Goblet cells	✓	✓	✗
3. Smooth muscle	✓	✓	✓
4. Cartilage	✓ (C-shaped ring)	✓ (irregular plates)	✗
5. Elastin	✓	✓	✓

Alveoli – Structure, Function and Why They Are Efficient for Gas Exchange

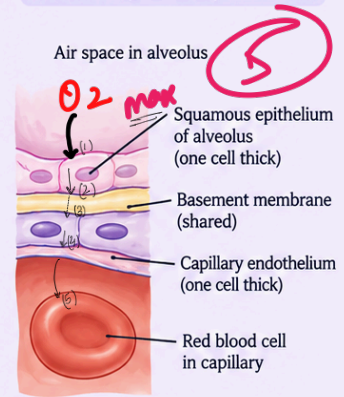
Location of Alveoli



Structure of an Alveolus



Structure of Alveolar Wall (in detail)



Functions of Alveoli

- 1 Provide a large surface area for gas exchange between air and blood.
- 2 Allow oxygen to diffuse into the blood and carbon dioxide to diffuse out of the blood, both by diffusion.
- 3 Work with the capillary network to maintain a steep concentration gradient for rapid gas exchange.

Key Structural Features

- **Many in number** – millions of tiny air sacs.
- **Thin walls** – one cell thick (squamous epithelium).
- **Moist surface** – gases dissolve before diffusing.
- **Dense capillary network** – close contact with blood.
- **Elastic fibres** – allow stretch and recoil.
- **Rich blood supply** – maintains concentration gradients.

Why Are Alveoli Efficient for Gas Exchange?

- 1 **Large surface area**
Millions of alveoli provide a very large total surface area.
- 2 **Thin walls**
Walls of alveolus and capillary are one cell thick → short diffusion distance.
- 3 **Good blood supply**
Dense capillary network brings deoxygenated blood and takes away oxygenated blood, maintaining a steep gradient.
- 4 **Ventilation**
Continuous breathing replaces alveolar air, keeping O₂ high and CO₂ low.
- 5 **Moist surface**
Gases dissolve in a thin film of moisture before diffusing.
- 6 **Elastic fibres**
Allow alveoli to stretch during inhalation and recoil during exhalation, aiding ventilation.

Alveoli are perfectly adapted to allow fast and efficient diffusion of gases between air and blood.

