

## Respiratory System

### External Nose

- The external surface of the nose is covered with keratinized stratified squamous epithelium

### Nasal Cavity

- It is lined by ciliated pseudostratified columnar epithelium with goblet cells, also known as **respiratory epithelium**.
- The conchae are covered by respiratory epithelium and specialized regions of olfactory epithelium.
- Olfactory epithelium is comprised of sustentacular, basal and olfactory cells.
- The balance of the nuclei belong to olfactory cells which are bipolar neurons with non-motile cilia.
- Chemical reaction then generates electrical impulses which are sent to the brain via axons of the olfactory nerve.
- Olfaction is assisted by serous secretions from olfactory glands (Bowman's glands) beneath the olfactory epithelium.

## **Vomeronasal Organ**

- The vomeronasal organ is a paired, tubular structure in the floor of the nasal cavity.
- The lateral surface of the tubule is lined with respiratory epithelium while the medial surface is lined with olfactory epithelium. It plays a role in chemoreception of soluble compounds.

## **Nasopharynx**

- It connects the nasal cavity to the pharynx. Respiratory epithelium lines the cavity

## **Larynx**

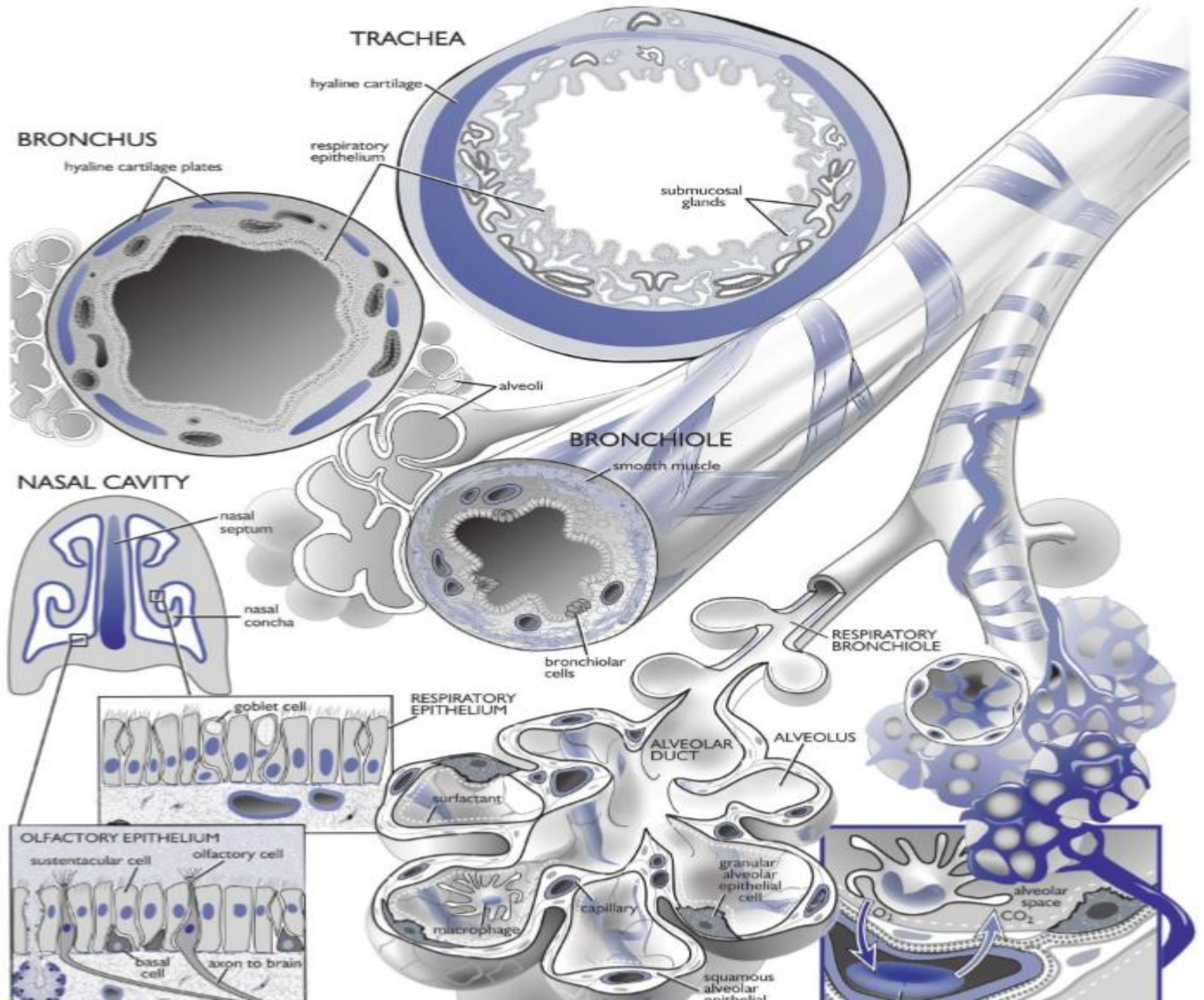
- Stratified squamous epithelium lines the larynx and transitions to respiratory epithelium before reaching the trachea.

## **Trachea**

- It is lined by respiratory epithelium. Seromucous submucosal glands produce tracheal secretions which are swept toward the larynx by the epithelial cilia.
- C-shaped hyaline cartilage rings in the propria-submucosa
- Smooth muscle connects the ends of the tracheal ring.
- The trachea is surrounded by a tunica adventitia.

# Lung

- The trachea branches into individual bronchi. Each **bronchus** is lined with respiratory epithelium.
- Bronchi branch to smaller **bronchioles** and the lining epithelium decreases in height to simple cuboidal epithelium.
- In this region, the epithelium is comprised of bronchiolar cells (Clara cells), ciliated lining cells, and neuroendocrine cells.
- Dome-shaped bronchiolar cells have microvilli
- The cartilage present in upper airways is replaced by prominent smooth muscle.
- Bronchioles continue as **respiratory bronchioles**.
- Gas exchange occurs in the alveoli which protrude from the walls of the respiratory bronchiole.
- The **alveolar duct** connects the respiratory bronchiole with the **alveolar sac**, a cluster of alveoli.
- The alveolus is a thin-walled structure where gas exchange occurs in the lung.
- Squamous alveolar epithelial cells are the primary lining cell. Scattered granular alveolar epithelial cells produce surfactant which maintains surface tension in the alveolus.
- In the lumen, alveolar macrophages remove particulate material from the epithelial surface.



# Blood-Air Barrier

- Gas exchange occurs across the blood-air barrier, consisting of the squamous alveolar epithelial cell, basement membrane of the epithelium, the septal space containing connective tissue and cells, the basement membrane of the pulmonary capillary and the capillary endothelial cell.

The squamous alveolar epithelial cell

