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учреждение высшего профессионального образования «Военно-  
медицинская академия имени С.М. Кирова»  
Министерства обороны Российской Федерации

# Human respiratory system

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для студентов 1 курса

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# Respiratory system contains:

- 1. Nasal cavity
- 2. Pharynx (Nasopharynx, oropharynx, laryngopharynx)
- 3. Trachea
- 4. Bronchus
- 5. Pulmonary alveolus
- 6. Bronchioles
- 7. Diaphragm

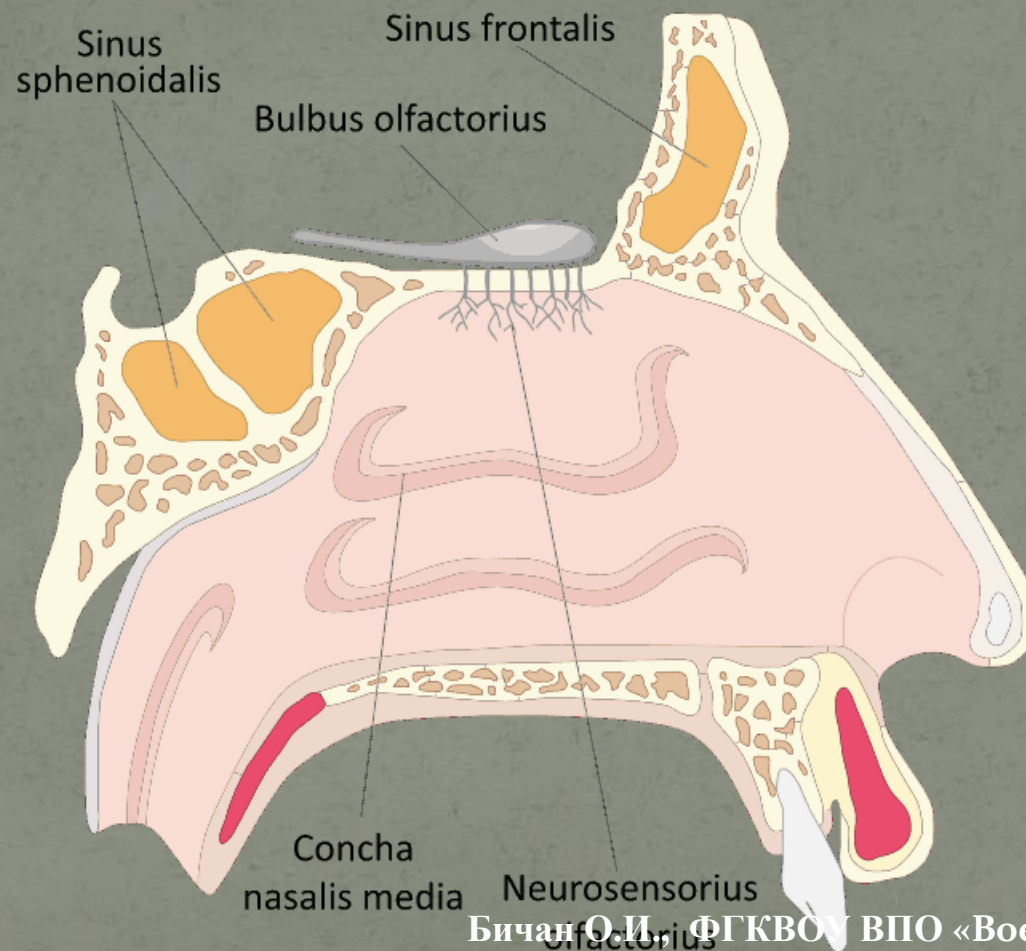


# *Nasal cavity*

- The nasal root is the top of the nose, forming an indentation at the suture where the nasal bones meet the frontal bone. The anterior nasal spine is the thin projection of bone at the midline on the lower nasal margin, holding the cartilaginous center of the nose. Adult humans have nasal hairs in the anterior nasal passage.



# *Nasal cavity*



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# Nasopharynx

- The most cephalad portion of the pharynx. It extends from the base of the skull to the upper surface of the soft palate. It includes the space between the internal nares and the soft palate and lies superior to the oral cavity. The pharyngeal tonsils, more commonly referred to as the adenoids, are lymphoid tissue structures located in the posterior wall of the nasopharynx. Polyps or mucus can obstruct the nasopharynx, as can congestion due to an upper respiratory infection. The Eustachian tubes, which connect the middle ear to the pharynx, open into the nasopharynx. The opening and closing of the Eustachian tubes serves to equalize the barometric pressure in the middle ear with that of the ambient atmosphere.

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# Nasopharynx

- The anterior aspect of the nasopharynx communicates through the choanae with the nasal cavities. On its lateral walls are the pharyngeal ostia of the auditory tube, somewhat triangular in shape, and bounded behind by a firm prominence, the torus tubarius or cushion, caused by the medial end of the cartilage of the tube that elevates the mucous membrane. Two folds arise from the cartilaginous opening:
- the salpingopharyngeal fold, a vertical fold of mucous membrane extending from the inferior part of the torus and containing the salpingopharyngeus muscle
- the salpingopalatine fold, a smaller fold extending from the superior part of the torus to the palate and containing the levator veli palatini muscle. the mucous membrane is lateral to the levator and does not contribute the fold, since the origin is deep to the cartilaginous opening.



# Oropharynx

- The oropharynx or mesopharynx lies behind the oral cavity, extending from the uvula to the level of the hyoid bone. It opens anteriorly, through the isthmus faucium, into the mouth, while in its lateral wall, between the Palatoglossal arch and the Palatopharyngeal arch, is the palatine tonsil. The anterior wall consists of the base of the tongue and the epiglottic vallecula; the lateral wall is made up of the tonsil, tonsillar fossa, and tonsillar (faucial) pillars; the superior wall consists of the inferior surface of the soft palate and the uvula. Because both food and air pass through the pharynx, a flap of connective tissue called the epiglottis closes over the glottis when food is swallowed to prevent aspiration. The oropharynx is lined by non keratinised squamous stratified epithelium.



# Laryngopharynx

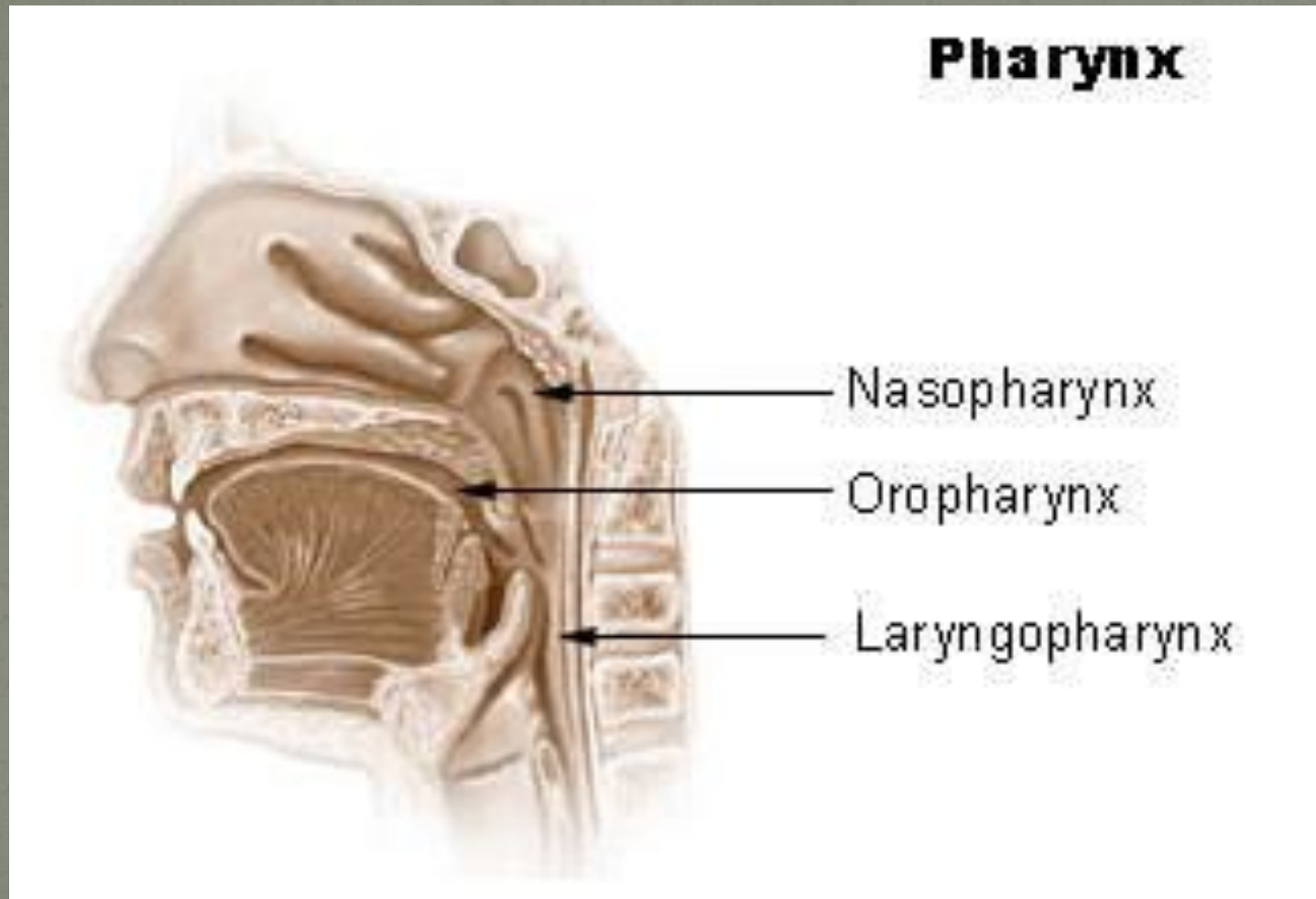
- The hypopharynx or laryngopharynx or (Latin: pars laryngea pharyngis) is the caudal part of the pharynx; it is the part of the throat that connects to the esophagus. It lies inferior to the epiglottis and extends to the location where this common pathway diverges into the respiratory (larynx) and digestive (esophagus) pathways. At that point, the laryngopharynx is continuous with the esophagus posteriorly. The esophagus conducts food and fluids to the stomach; air enters the larynx anteriorly. During swallowing, food has the "right of way", and air passage temporarily stops. Corresponding roughly to the area located between the 4th and 6th cervical vertebrae, the superior boundary of the laryngopharynx is at the level of the hyoid bone.

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# Nasopharynx , oropharynx , laryngopharynx



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# Trachea

- In tetrapod anatomy the trachea, or windpipe, is a tube that connects the pharynx and larynx to the lungs, allowing the passage of air. It is lined with pseudostratified ciliated columnar epithelium cells with goblet cells that produce mucus. This mucus lines the cells of the trachea to trap inhaled foreign particles that the cilia then waft upward toward the larynx and then the pharynx where it can be either swallowed into the stomach or expelled as phlegm.
- Despite the name, not all vertebrates have a trachea; only non-fish ones. The name is used in contrast with invertebrate trachea, a structure in arthropod anatomy.



# Trachea

Upper respiratory tract

Nasal cavity

Pharynx

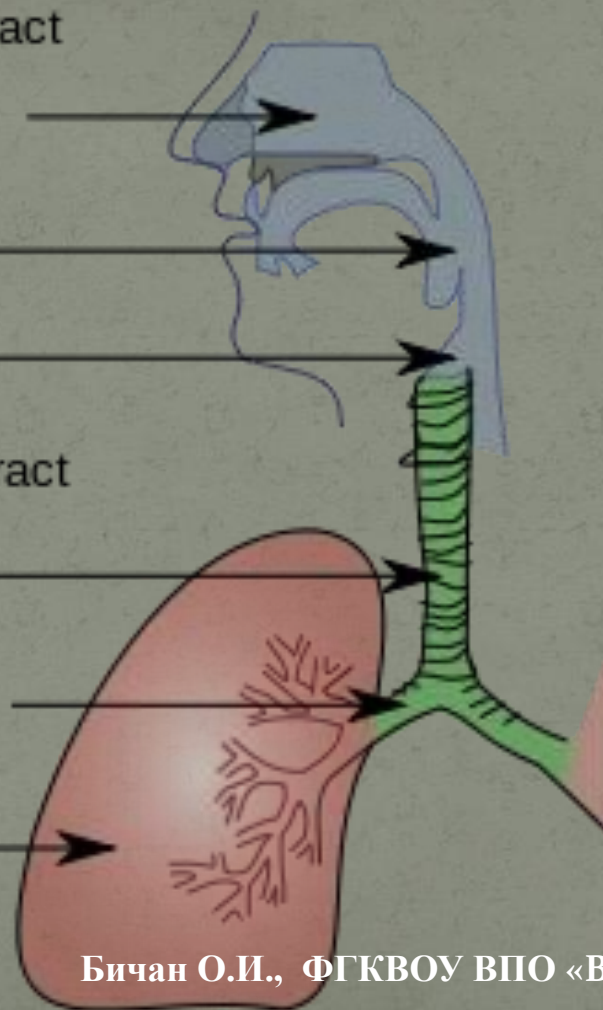
Larynx

Lower respiratory tract

Trachea

Primary bronchi

Lungs



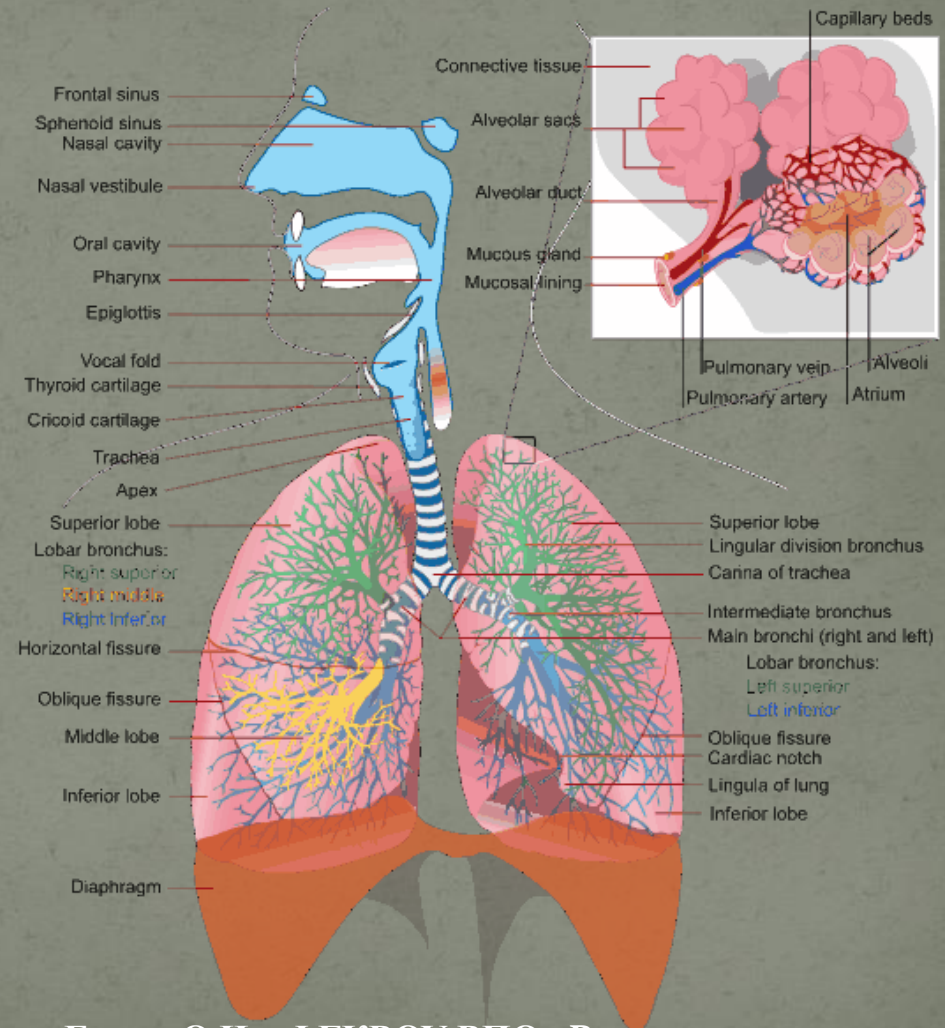
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# Bronchus

- A **bronchus** (plural **bronchi**, adjective **bronchial**) is a passage of airway in the respiratory tract that conducts air into the lungs. The bronchus branches into smaller tubes, which in turn become bronchioles. No gas exchange takes place in this part of the lungs.





# Pulmonary alveolus

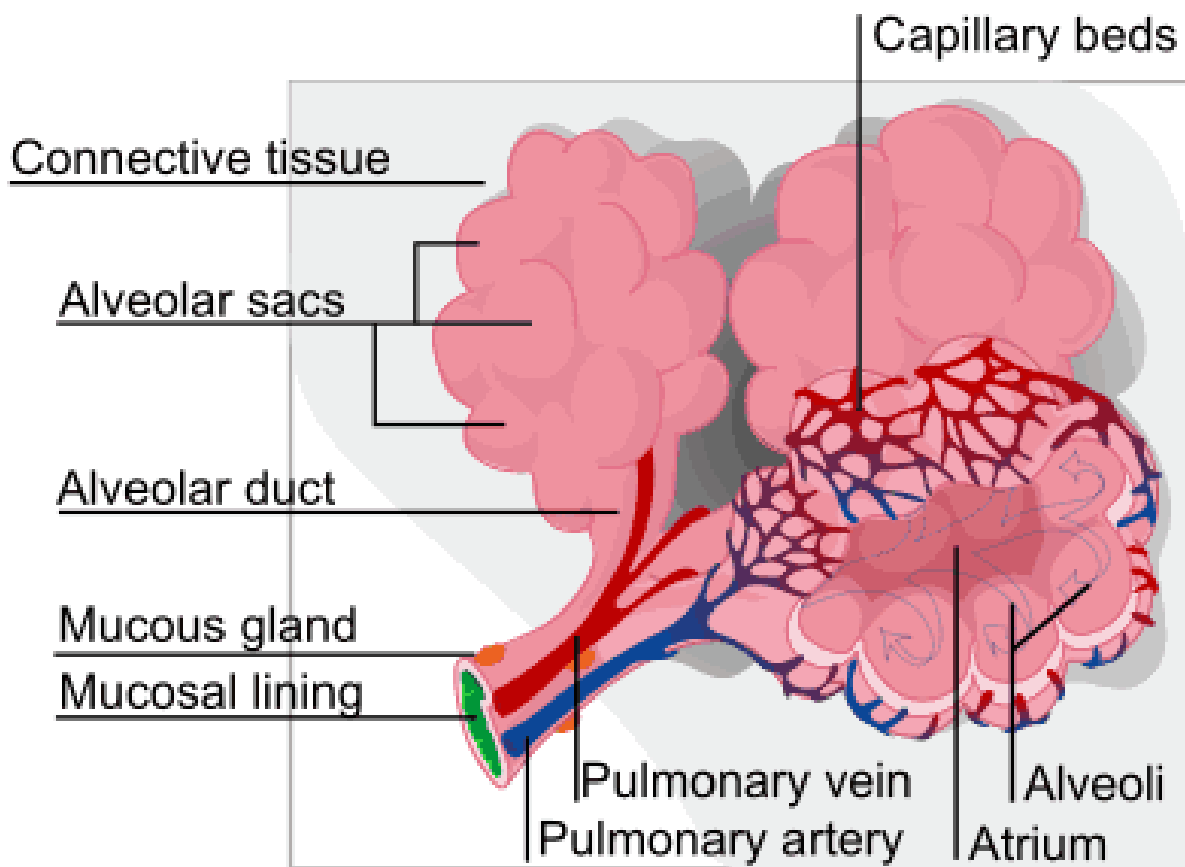
- An alveolus (plural: alveoli, from Latin alveolus, "little cavity") is an anatomical structure that has the form of a hollow cavity. Found in the lung parenchyma, the pulmonary alveoli are the terminal ends of the respiratory tree, which outcrop from either alveolar sacs or alveolar ducts, which are both sites of gas exchange with the blood as well . Alveoli are particular to mammalian lungs. Different structures are involved in gas exchange in other vertebrates. The alveolar membrane is the gas-exchange surface. Carbon dioxide rich blood is pumped from the rest of the body into the alveolar blood vessels where it through diffusion releases its carbon dioxide and absorbs oxygen.

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# Pulmonary alveolus



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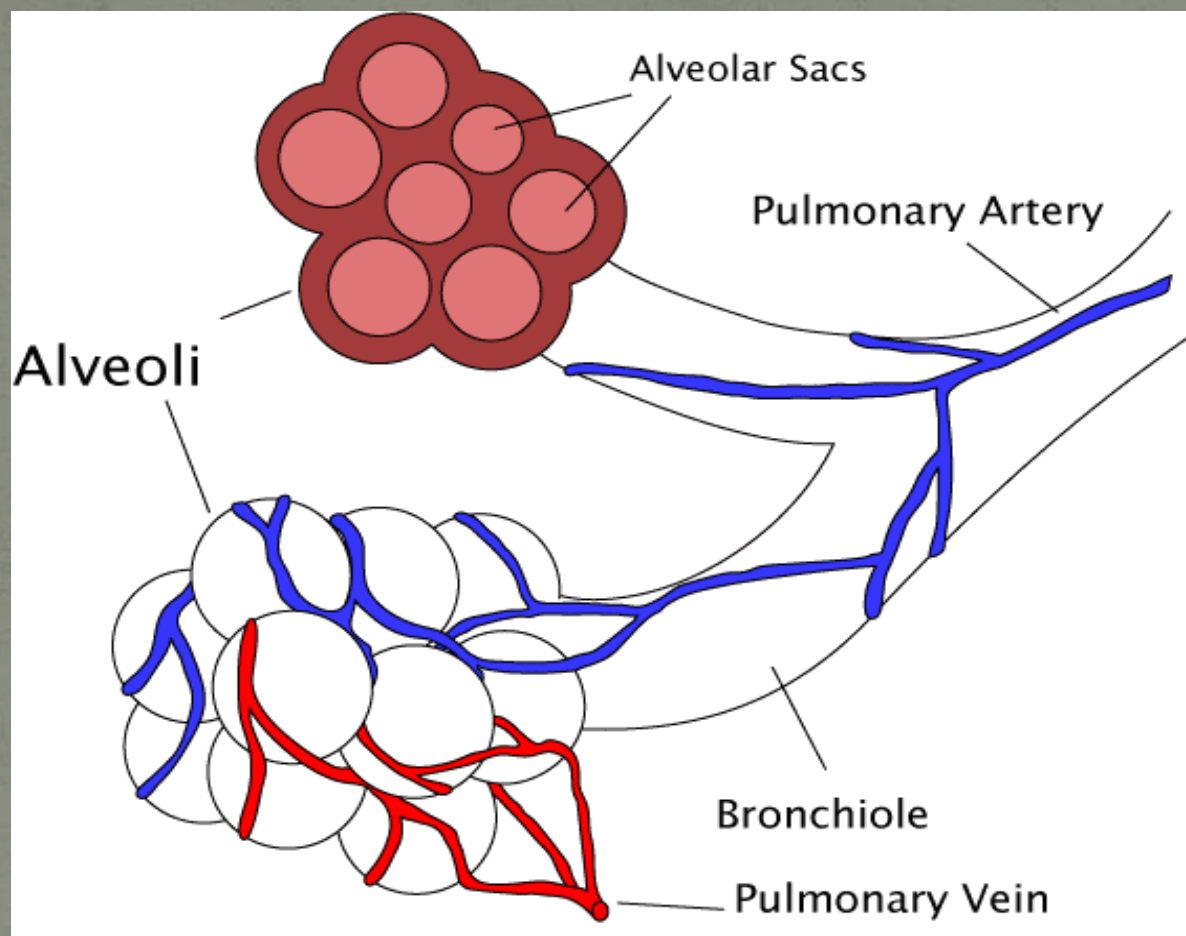


# Bronchioles

- The bronchioles or bronchioli are the first passageways by which the air passes through the nose or mouth to the air sacs of the lungs in which branches no longer contain cartilage or glands in their submucosa. They are branches of the bronchi. The bronchioles terminate by entering the circular sacs called alveoli.



# Bronchioles



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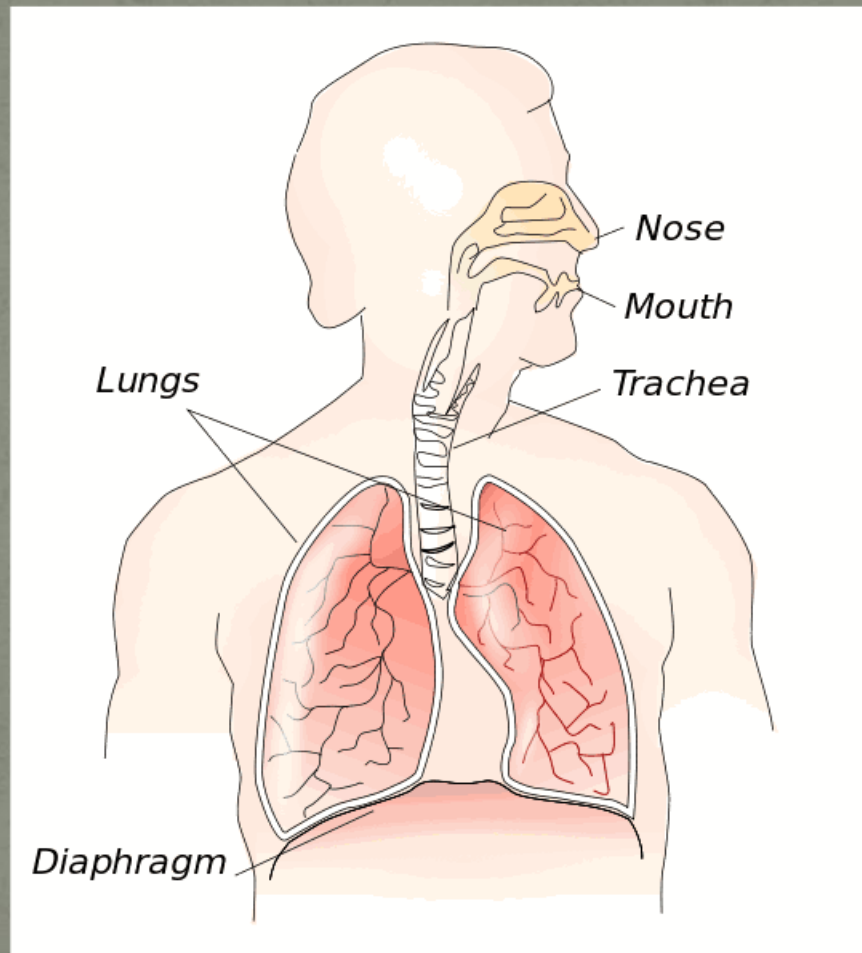


# Diaphragm

- In the anatomy of mammals, the thoracic diaphragm, or simply the diaphragm (Ancient Greek: διάφραγμα *diáphragma* "partition"), is a sheet of internal skeletal muscle that extends across the bottom of the rib cage. The diaphragm separates the thoracic cavity (heart, lungs & ribs) from the abdominal cavity and performs an important function in respiration: as the diaphragm contracts, the volume of the thoracic cavity increases and air is drawn into the lungs.
- A "diaphragm" in anatomy can refer to other flat structures such as the urogenital diaphragm or pelvic diaphragm, but "the diaphragm" generally refers to the thoracic diaphragm. Other vertebrates such as amphibians and reptiles have diaphragms or diaphragm-like structures, but important details of the anatomy vary, such as the position of lungs in the abdominal cavity.



# Diaphragm



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# The end

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