

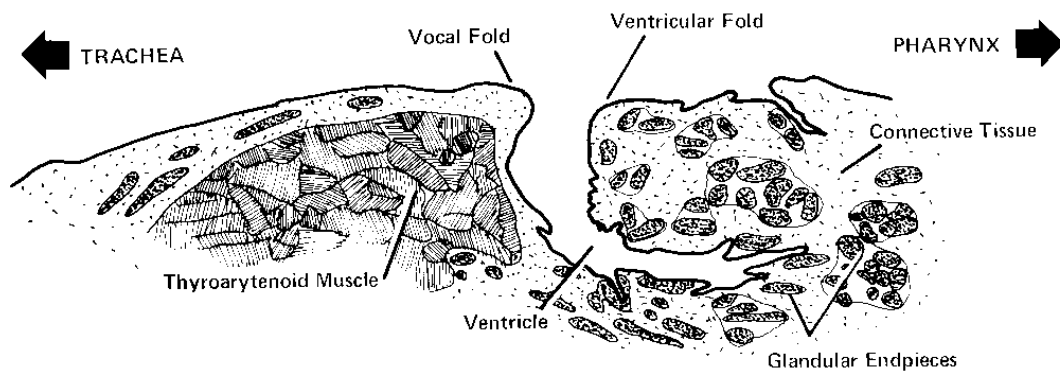
## RESPIRATORY SYSTEM

### I. Larynx.

Slide 171 Larynx, Homo, H&E

**Slides 171** In this preparation, a longitudinal (frontal) section has been made through the lateral wall. The supporting cartilages are not included but the plane of section transects both vocal folds.

Imagine the continuity of the specimen with the trachea to one side and the pharynx to the other (refer to drawing).



The location of the thyroarytenoid muscle and the shape of the ventricle in the specimen can be used to determine the direction of the organs.

Study the true vocal fold, noting its stratified squamous epithelium which may be keratinized. Note that the connective tissue of the true vocal fold has no glands. A dense elastic band forms one of the two inferior thyroarytenoid ligaments. Beneath the thyroarytenoid ligament is the striated thyroarytenoid muscle. Follow the epithelium from the true vocal fold into the ventricle, noting it changes abruptly from a stratified squamous to a pseudostratified columnar epithelium at the point where the epithelium was torn.

The epithelium undergoes metaplasia quite readily in response to irritation or abrasion, and in other specimens it is possible to find patches of epithelium in transition from a pseudostratified columnar to a stratified squamous epithelium.

## II. Trachea.

Slide 173 Trachea, Homo, H&E

**Slide 173.** Study the tissue elements in this longitudinal (frontal) section through the trachea, and delimit the layers. The mucosa is composed of the epithelium, a prominent basement membrane, and the lamina propria. The latter has a condensation of elastic fibers bordering the submucosa. The submucosa contains mixed mucous and serous glands. The adventitia is the level where the tracheal cartilages are located. Four tracheal cartilages appear in this section. Connective tissue fills in the gaps between the pieces of cartilage. On the exterior surface there is a final layer of connective tissue. Smooth muscle fills in between the ends of the C- shaped cartilages but is not seen on this slide because of the plane of section.

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III. Lung.

Slide 175.1 Lung, Monkey, H&E 1.5um

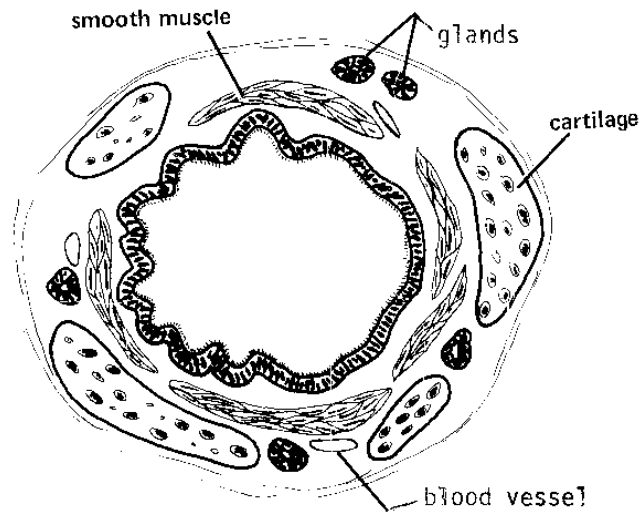
Slide 177 Lung, Kitten, Orcein & Masson

Slide 178 Lung, Homo, H&E

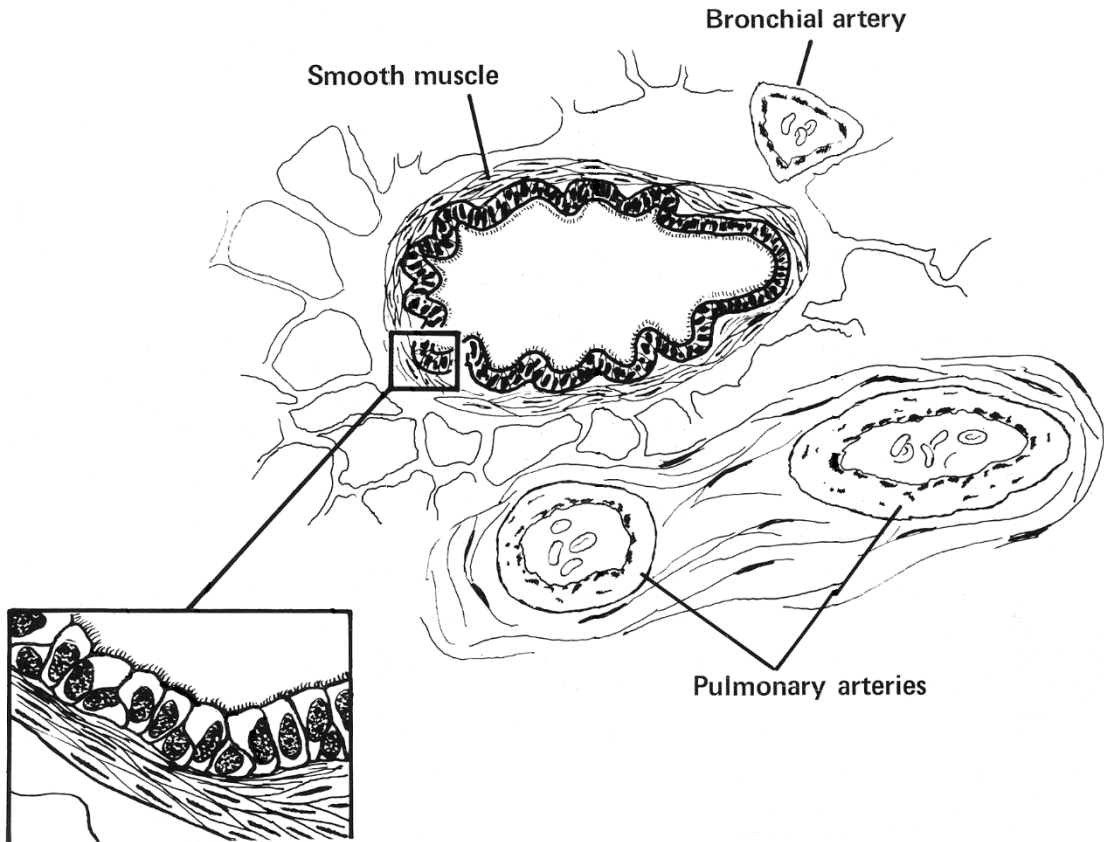
It is a peculiarly difficult to prepare satisfactory histological sections of the lung. The lung tends to collapse when the pleural cavity is opened, fixatives penetrate poorly, and the blood vessels become congested. Slide 178 is particularly good.

**Slides 178.** Examine the slides with low magnification for the presence of the following structures:

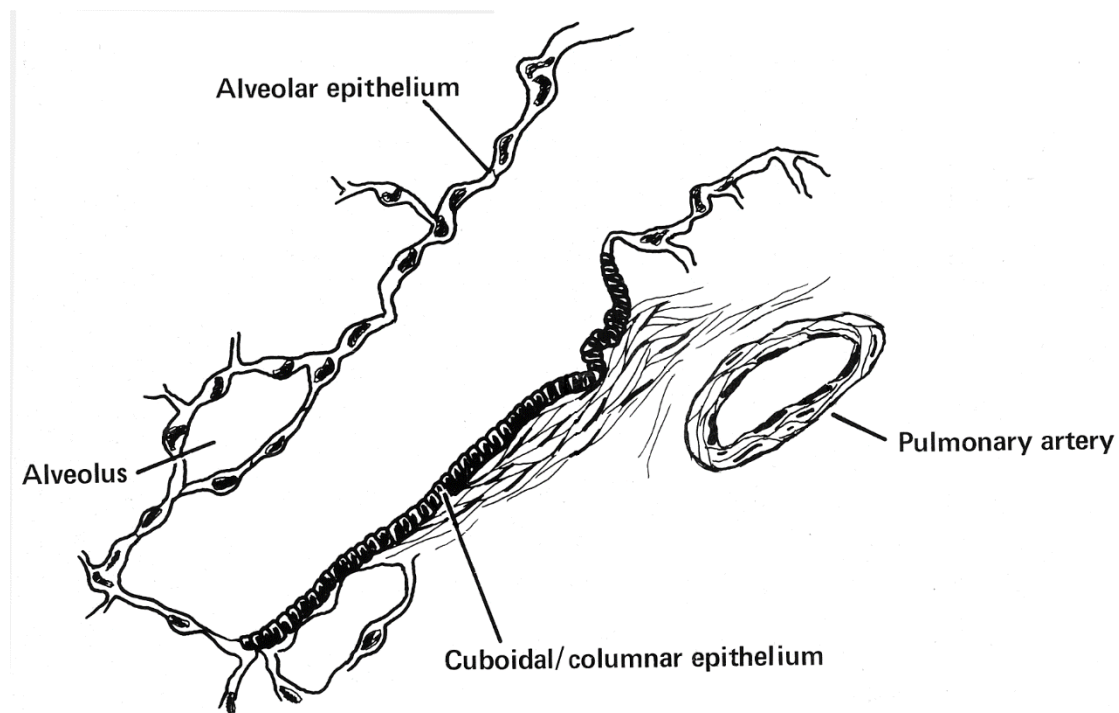
- A. Bronchus: characterized by the presence of hyaline cartilage and glands. Look also for two vessels: the pulmonary artery lies outside the wall of the bronchus and the bronchiole artery which is much smaller lies within the wall of the bronchus.



B. Bronchiole: lacks cartilage and glands and has a complete lining of histologically visible epithelium and smooth muscle. Goblet cells are not seen only ciliated cells and Clara cells.



- C. Respiratory bronchiole: has visible epithelium only on parts of the wall of the structure; the rest of the wall is composed of alveolar (very thin) epithelium.



- D. alveoli: are crescent shaped sacs with walls specialized for gas exchange; cellular elements (capillary endothelial cells and type 1 pneumocytes) of the alveolar wall cannot be discerned easily with the light microscope. Note that the alveolar wall is really an interalveolar wall.
- E. pulmonary arteries: are found in association with bronchi and bronchioles as far as the respiratory bronchiole.
- F. pulmonary veins: are located at a distance from the bronchi and bronchioles and surrounded by alveoli.

**Slide 177.** This preparation also provides good examples of dust cells and bronchi. The macrophages (dust cells) lie in the alveolar lumen and contain large vacuoles.

### **OPTIONAL**

**Slide 175.1** This slide has been used to identify type 2 pneumocytes, endothelial cells, macrophages and air blood barrier. The identification of these cells is especially difficult and time consuming.

Type 1 pneumocytes and endothelial cells of the air barrier are thin and closely spaced making them difficult if not impossible to identify as individual cells most of the time. The

cytoplasm of the Type 2 pneumocyte is basophilic and contains vacuoles. The macrophage in contrast contains small dark or brown particles.

#### IV. ELECTON MICROPGRAPHS

Review the electron micrographs after the laboratory. The EMs will be added to screen shots of the slides after the laboratory session.

##### EM 5126 - Type 1 and Type 2 Pneumocytes

A type 1 and a type 2 pneumocyte are seen here side by side. The type 1 pneumocyte has a flattened, elongated nucleus with a thin rim of cytoplasm. The type 2 pneumocyte has a larger, rounded nucleus and lamellar structures in its cytoplasm. Note the occasional bundles of fine collagen fibers that are present in the extracellular space. (Mouse - X 18,200).

##### Lamella Body

This is a higher magnification of the distinctive lamellar bodies found typically in type 2 pneumocyte. These structures are implicated in the synthesis and secretion of surfactant. (Mouse - X 52,000).

##### EM 5169 - Alveolar Septum

This micrograph shows portions of two alveolar septa with a free macrophage or dust cell in the lumen of the alveolus. A portion of a type 2 pneumocyte is present in one system (upper right) and a continuous capillary is present in the other (lower right). Note the attenuated cytoplasm of the endothelial cell and type 1 pneumocyte that separates the vascular space of the capillary from the alveolar space of the alveolus. (Mouse - X 10,400).