

RESPIRATORY SYSTEM

The respiratory system , composed of the lungs and a sequence of airways leading to the external environment, functions in providing oxygen to and eliminating carbondioxide from the cells of the body.

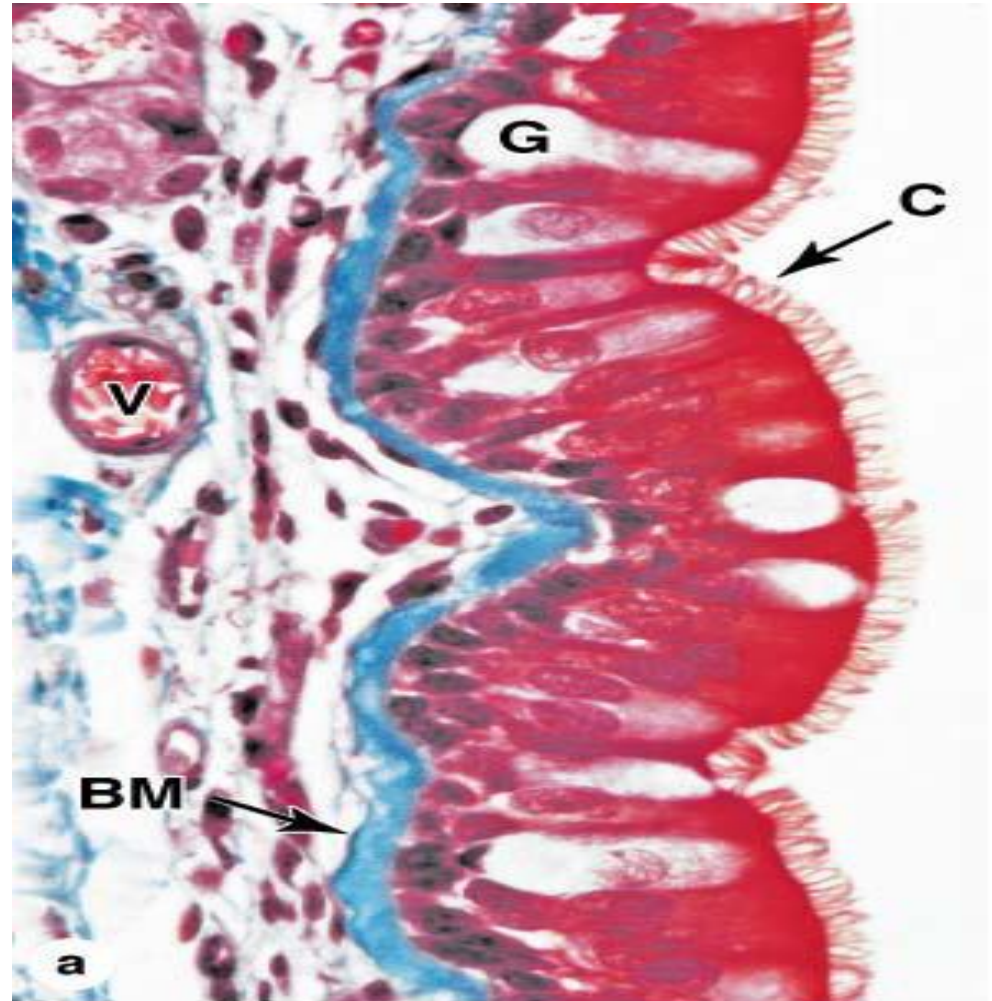
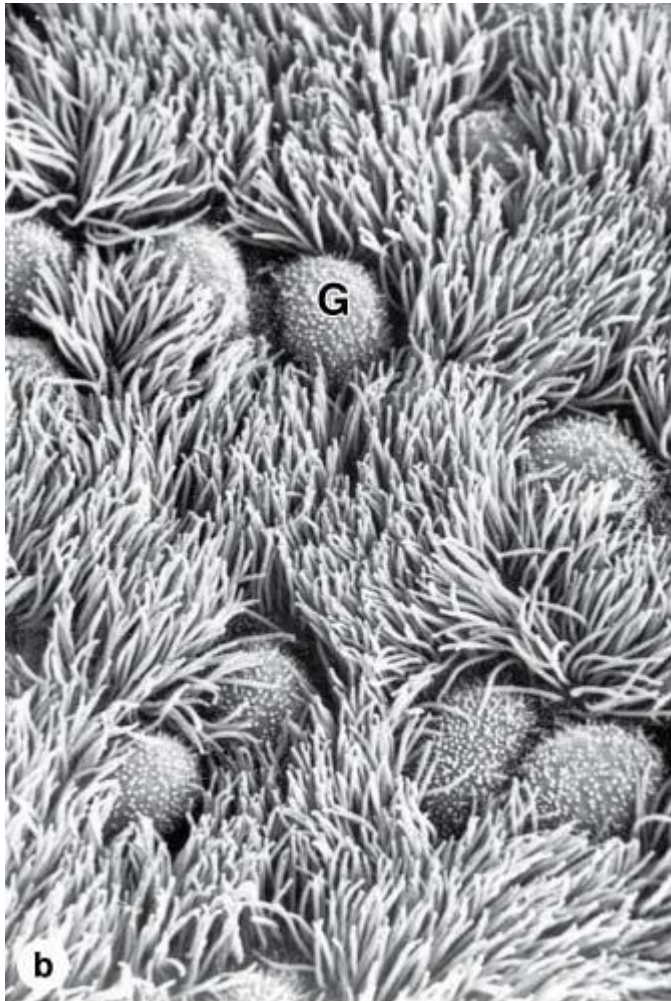
Respirations: a) movement of air in and out of the lungs (breathing or ventilation)

b)Exchange of oxygen in the inspired air for carbondioxide in the blood (external respiration)

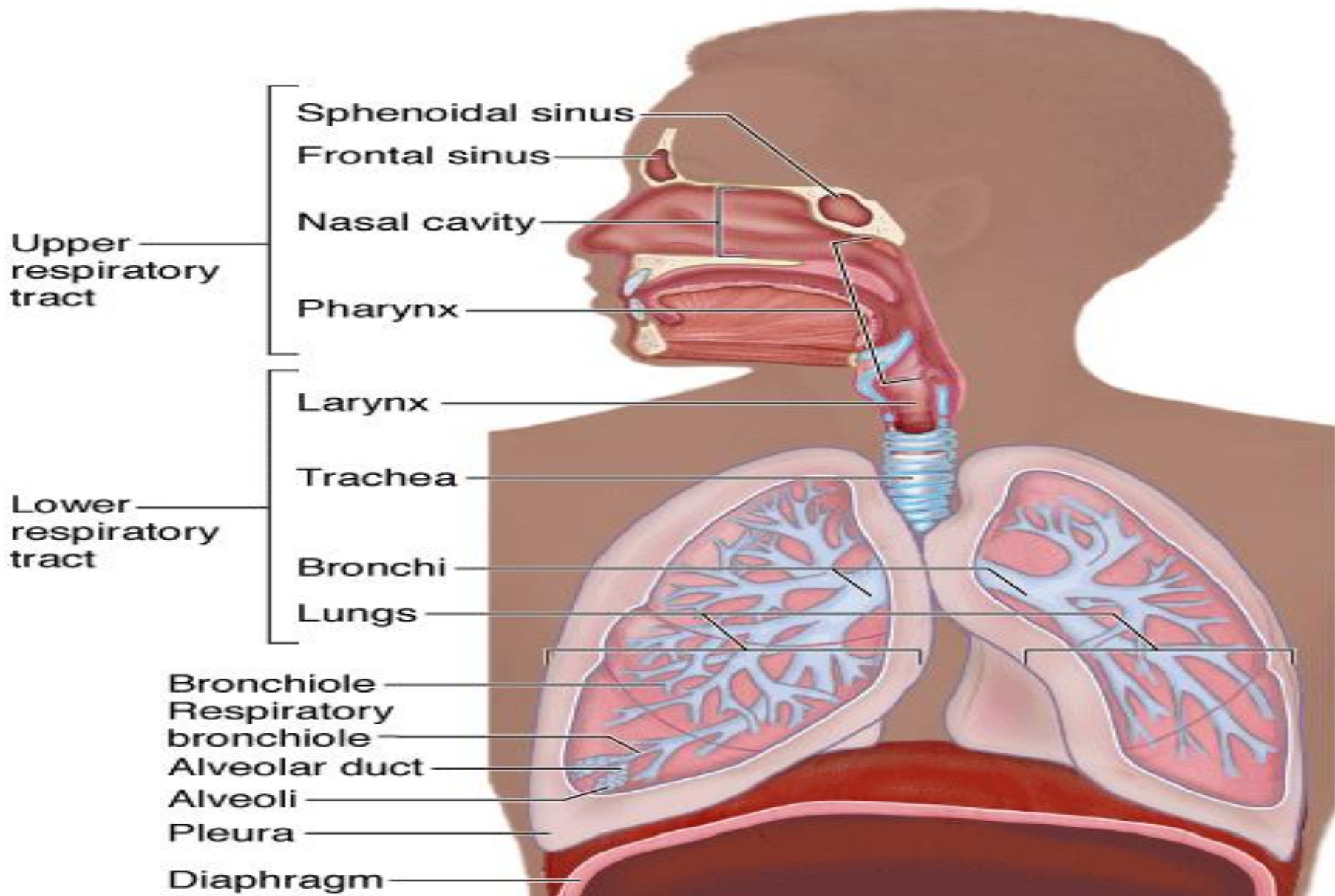
c)conveyance of oxygen and carbondioxide to and from the cells (Transport of gases)

d)Exchange of CO_2 for oxygen in the vicinity of the cell(internal respiration)

Respiratory epithelium: Ciliated columnar cells, Goblet cells, Brush cells, Basal cells.



Junqueira, L. C., & Mescher, A. L. (2009). Junqueira's basic histology: text & atlas 12th Edition/Anthony L. Mescher. New York [etc.]: McGraw-Hill Medical

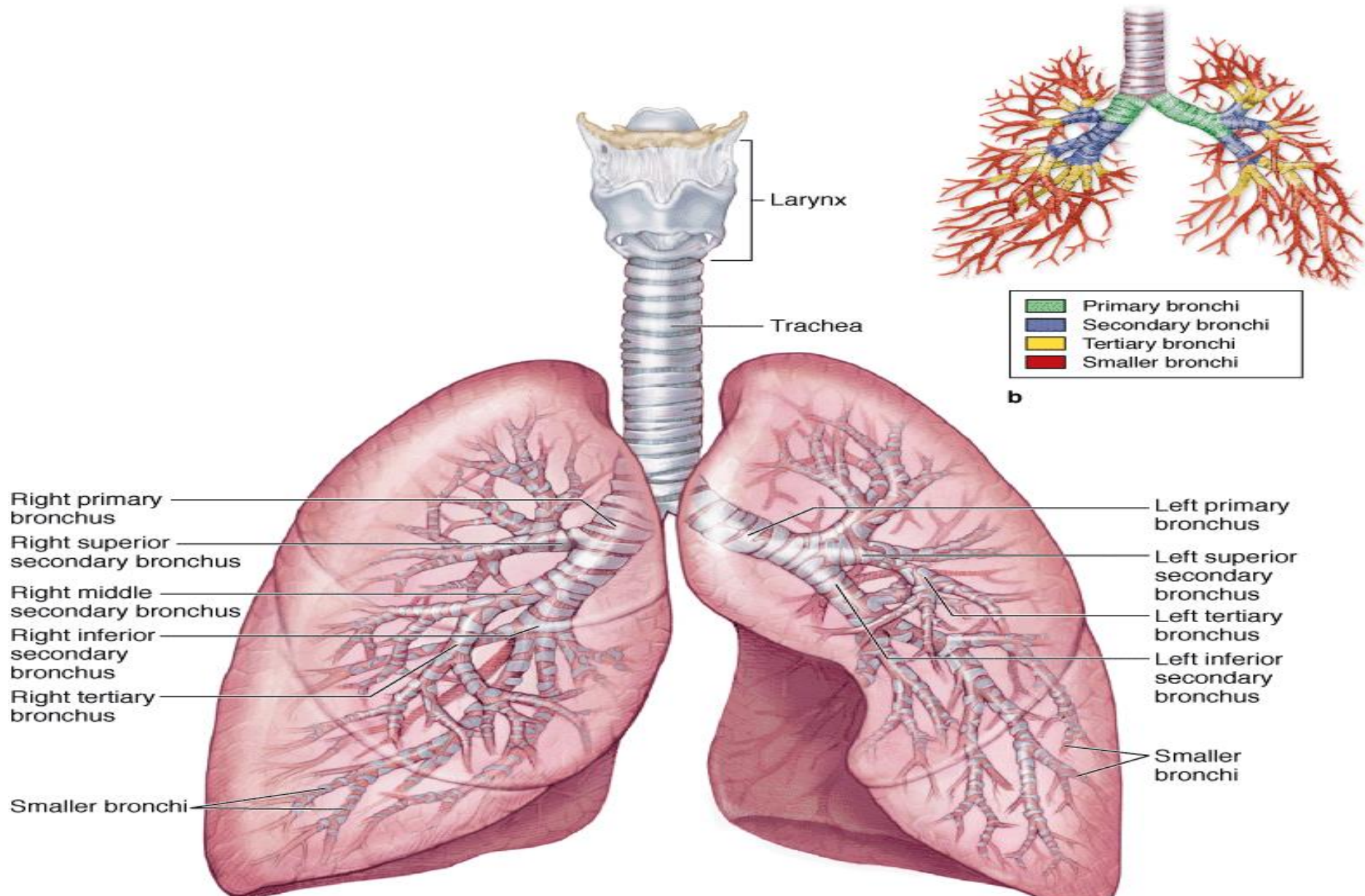


Junqueira, L. C., & Mescher, A. L. (2009). Junqueira's basic histology: text & atlas 12th Edition/Anthony L. Mescher. New York [etc.]: McGraw-Hill Medical

The respiratory epithelium , a pseudostratified ciliated columnar epithelium is separated from the lamina propria by a thick basement membrane. The epithelium is composed of 6 cells types: goblet cells, ciliated columnar cells, basal cell, brush cell, serous cell and cells of the diffuse neuroendocrine system(DNES). All of these cells come into contact with the basal membrane but they dont all reach the lümen.

Trachea; is a tube ,12 cm long and 2 cm in diameter. That begins at the cricoid cartilage of the larynx and ends when it bifurcates to form the primary bronchii. The Wall of trachea is reinforced by 10-12 horseshoe shaped hyaline cartilage rings (C- rings). The open ends of rings face posteriorly and are connected to each other by smooth muscle, the trachealis muscle. The trachea has three layers, the mukoza, the submukoza and an adventisia

Mucosa;The mucosal lining of the trachea is composed of pseudostratified ciliated columnar (respiratory) epithelium.



Junqueira, L. C., & Mescher, A. L. (2009). Junqueira's basic histology: text & atlas 12th Edition/Anthony L. Mescher. New York [etc.]: McGraw-Hill Medical

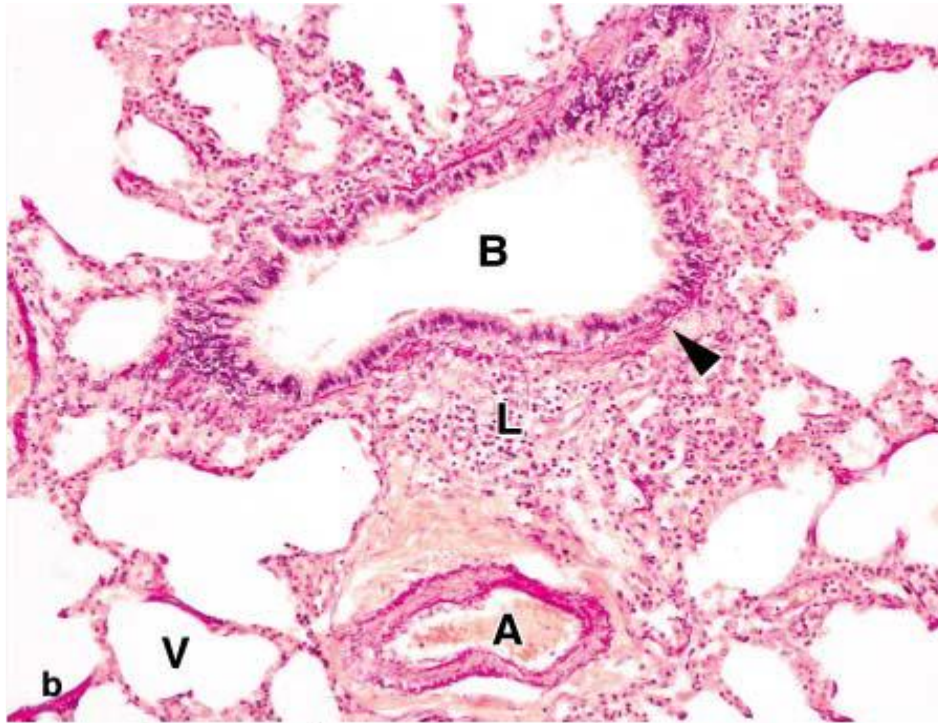
Bronchial tree; begins at the bifurcation of the tracheas as the right and left primary bronchi.

The bronchial tree is composed of airways located outside the lungs (the primary bronchi, extrapulmonary bronchi) and airways located inside the lungs; intrapulmonary bronchi (secondary and tertiary bronchi), bronchioles; terminal bronchioles and respiratory bronchioles.

Primary bronchi (extra pulmonary bronchi)

Secondary, tertiary bronchioles (intrapulmonary bronchioles)-
terminal bronchioles, respiratory bronchioles.

Bronchioles: 1) Bronchioles terminales
2) Bronchioles respiratoryus



Junqueira, L. C., & Mescher, A. L. (2009). Junqueira's basic histology: text & atlas 12th Edition/Anthony L. Mescher. New York [etc.]: McGraw-Hill Medical



Junqueira, L. C., & Mescher, A. L. (2009). Junqueira's basic histology: text & atlas 12th Edition/Anthony L. Mescher. New York [etc.]: McGraw-Hill Medical

Clara cells: are columnar with dome shaped apices that have short, blunt microvilli. Their apical cytoplasm houses numerous secretory granules containing glycoproteins manufactured on their abundant RER. Clara cells are believed to protect the bronchiolar epithelium by lining it with their secretory product. Some investigators also suggest that clara cells produce a surfactant like material that reduces the surface tension of bronchioles and facilitates the maintenance of their patency. Finally clara cells divide to regenerate the bronchiolar epithelium.

Terminal bronchioles; The epithelium of terminal bronchioles is composed of clara cells and cuboidal cells some with cilia. The narrow lamina propria consist of fibroelastic connective tissue and is surrounded by one or two layers of smooth muscle cells.

Respiratory Bronchioles; are similar in structure to terminal bronchioles, except that walls is interrupted by the presence of thin-walled, pouch-like structure known as alveoli, where gas can be exchanged. As respiratory bronchioles branch they become narrower in diameter and their population of alveoli increases.

Alveoli; walls of alveoli are composed of two types of cells: Type I pneumocytes and type II pneumocytes.

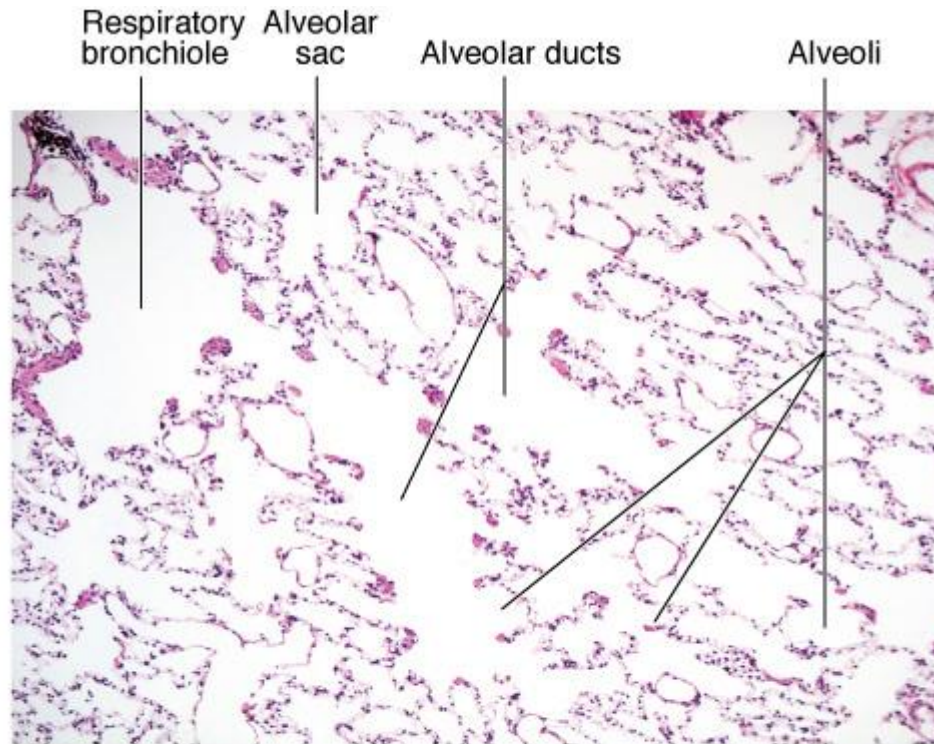
Type I pneumocytes: Approximately 95 % of the alveolar surface is composed of simple squamous epithelium, whose cells are known as type I pneumocytes (also called type I alveolar cells or squamous alveolar cells.)

Type II pneumocytes; they occupy only about 5% of the alveolar surface. These cuboidal cells are interspersed among and form occluding junctions with type I pneumocytes. Their dome-shaped apical surface projects into the lumen of the alveolus.

Pulmonar surfactant, syntesized on the RER of type II pneumonocytes. Surfactant is released by exocytosis into the lümen of the alveolus.

Alveolar macrophages; monocytes gain acces to the pulmonary interstitium, become alveolar macrophages(dust cells) migrate between type I pneumocytes and enter the lümen of the alveolus.

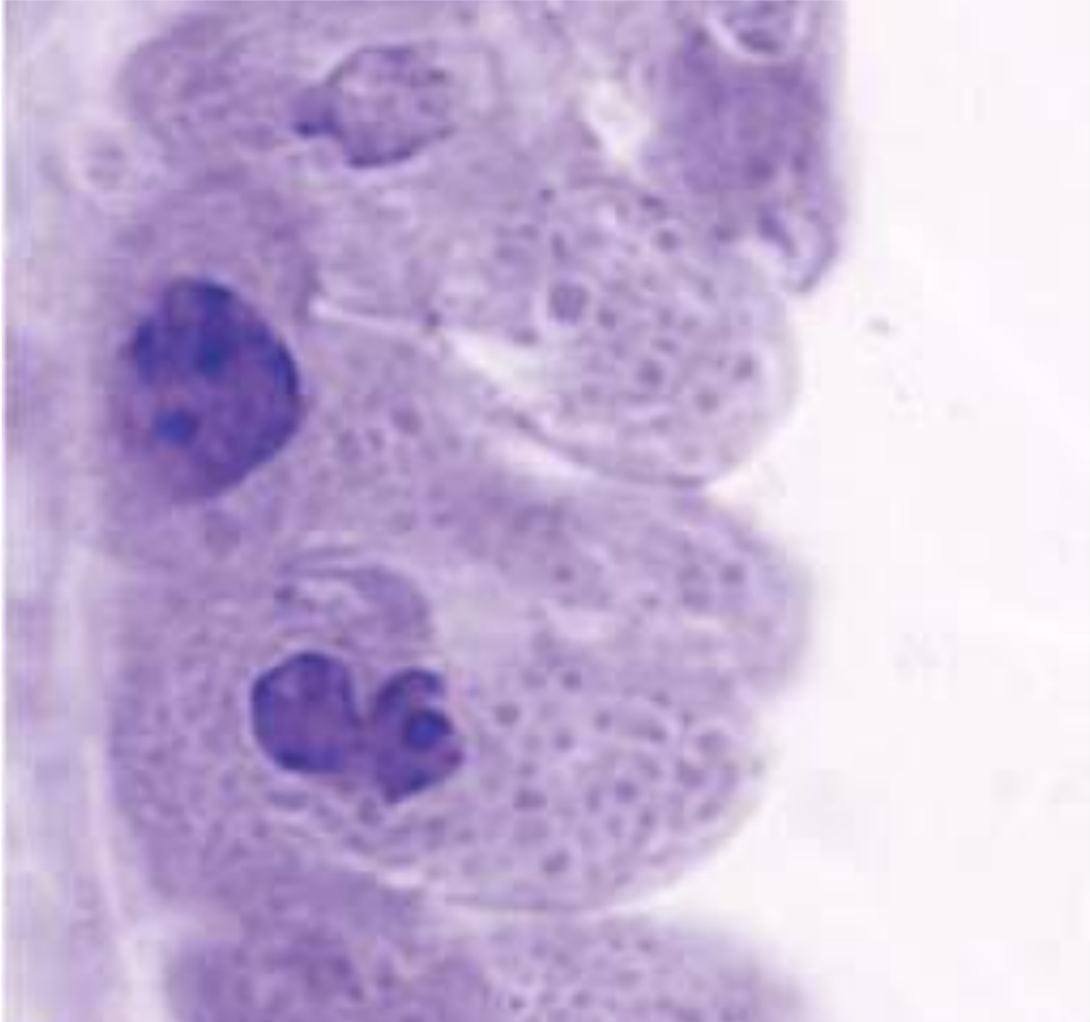
The thinnest regions of the interalveolar septum in which gases can be exchanged are called the blood-gas barriers.



b

Junqueira, L. C., & Mescher, A. L. (2009). Junqueira's basic histology: text & atlas 12th Edition/Anthony L. Mescher. New York [etc.]: McGraw-Hill Medical

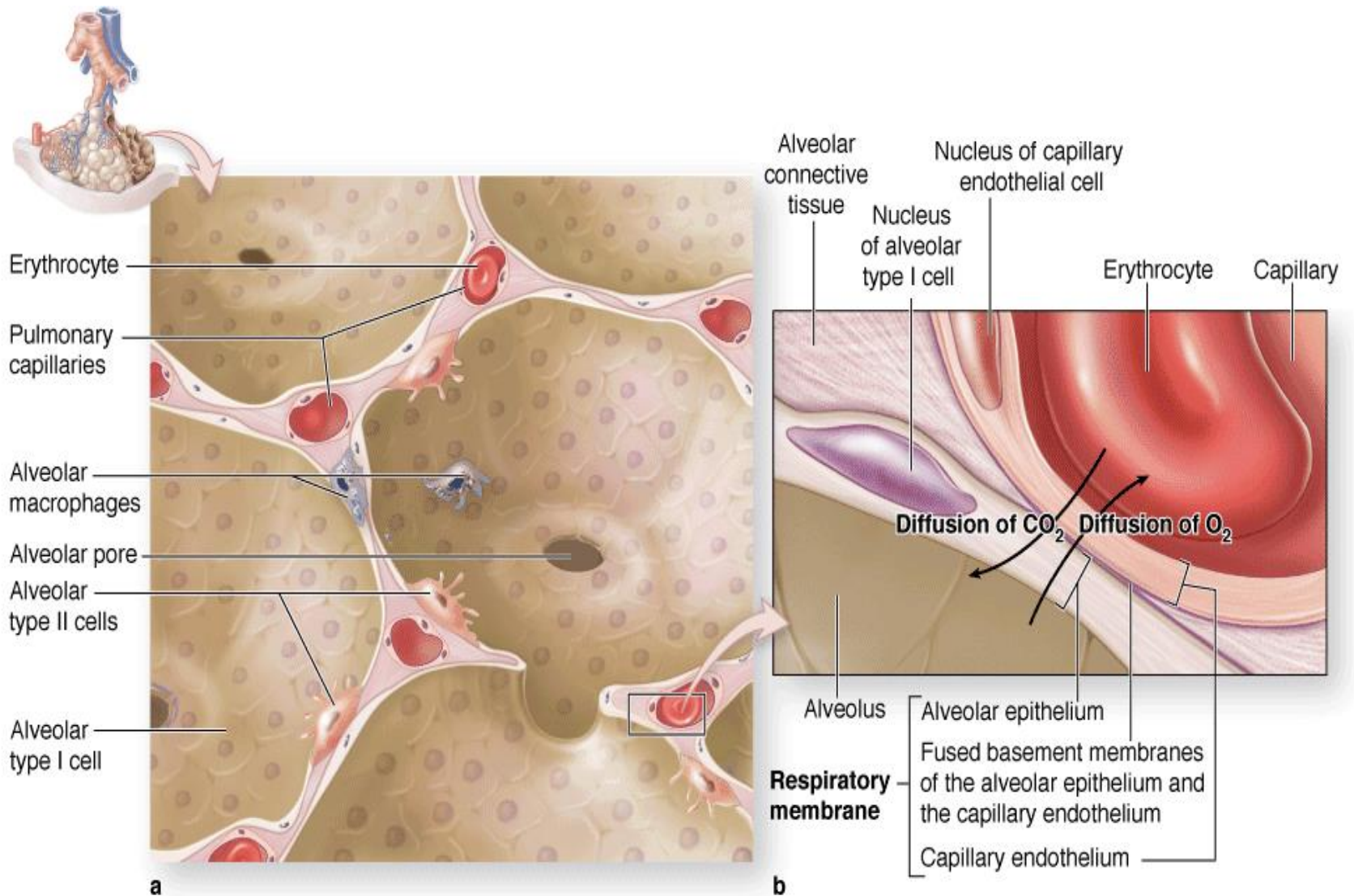
Clara cells



Junqueira, L. C., & Mescher, A. L. (2009). Junqueira's basic histology: text & atlas 12th Edition/Anthony L. Mescher. New York [etc.]: McGraw-Hill Medical

The narrowest **blood-gas barrier** ,where the type I pneumocytes is in intimate contact with the endothelial lining of the capillary and the basal laminae of the two epithel become fused , is most efficient fort he exchanged of oksigen .This region are composed of the following three structure :

- Surfactant and type I pneumocytes
- Fused basal lamina of type I pneumocytes and endothelial cells of the capillary



Junqueira, L. C., & Mescher, A. L. (2009). Junqueira's basic histology: text & atlas 12th Edition/Anthony L. Mescher. New York [etc.]: McGraw-Hill Medical

REFERENCES:

- Gartner, L.P. & Hiatt, J.L. (1997). *Color textbook of Histology*: W.B. Saunders Company. Philadelphia, Pensilvanya, USA. Ch. 15, pp. 284-301.
- Junqueira, L. C., & Mescher, A. L. (2009). *Junqueira's basic histology: text & atlas (12th ed.)*/Anthony L. Mescher. New York [etc.]: McGraw-Hill Medical, Chapter 17, pp. 377-396.