

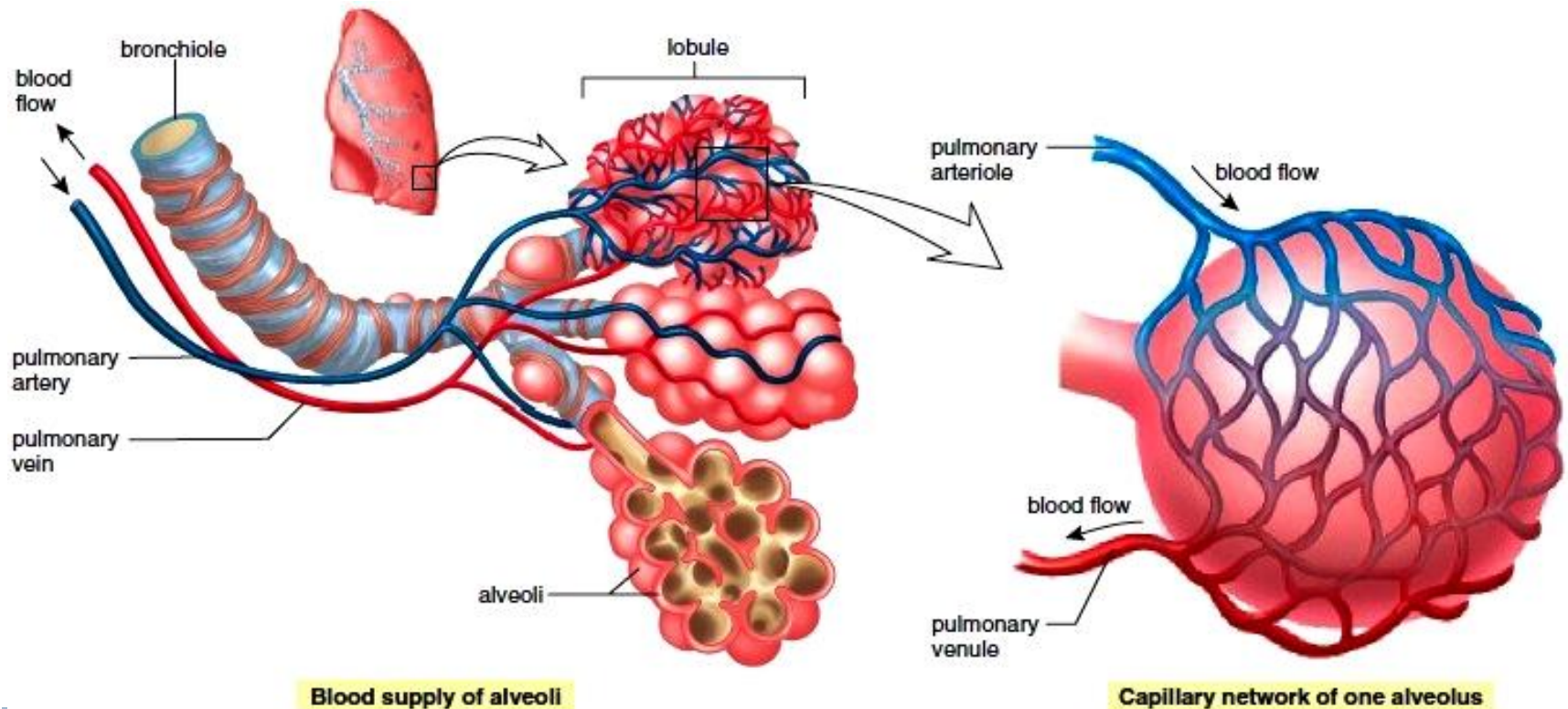


Respiratory System



Introduction

- ▶ The primary function of the respiratory system is to **provide oxygen** to, and **remove carbon dioxide** from, the **circulating blood**.



Respiratory System

The respiratory tract has 2 parts

1. **Conducting portion,**

Nasal cavities,

Nasopharynx,

Larynx,

Trachea,

Bronchi

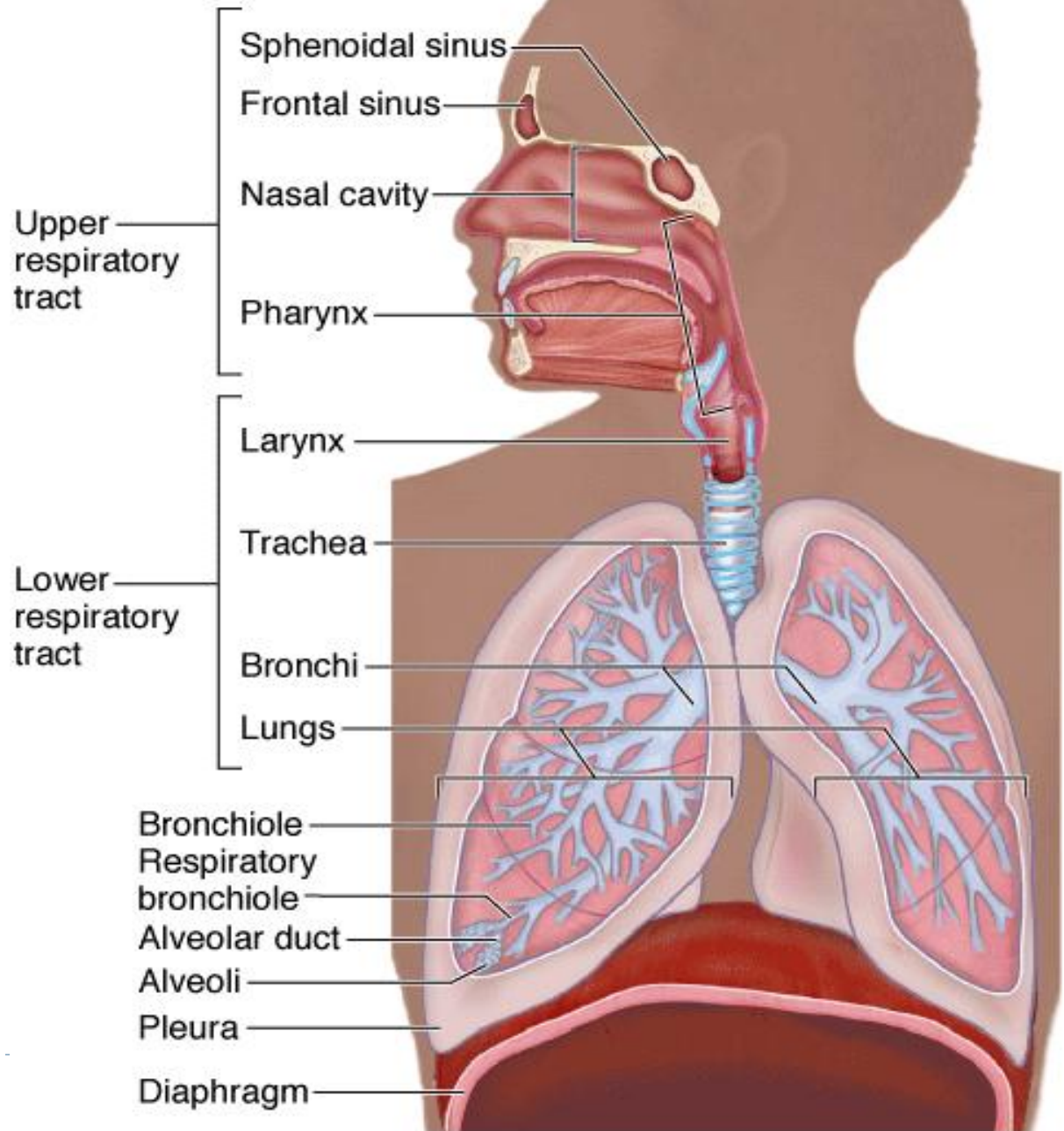
Bronchioles, and

terminal Bronchioles

2. **Respiratory portion**

1. Small terminal Bronchioles and Alveoli

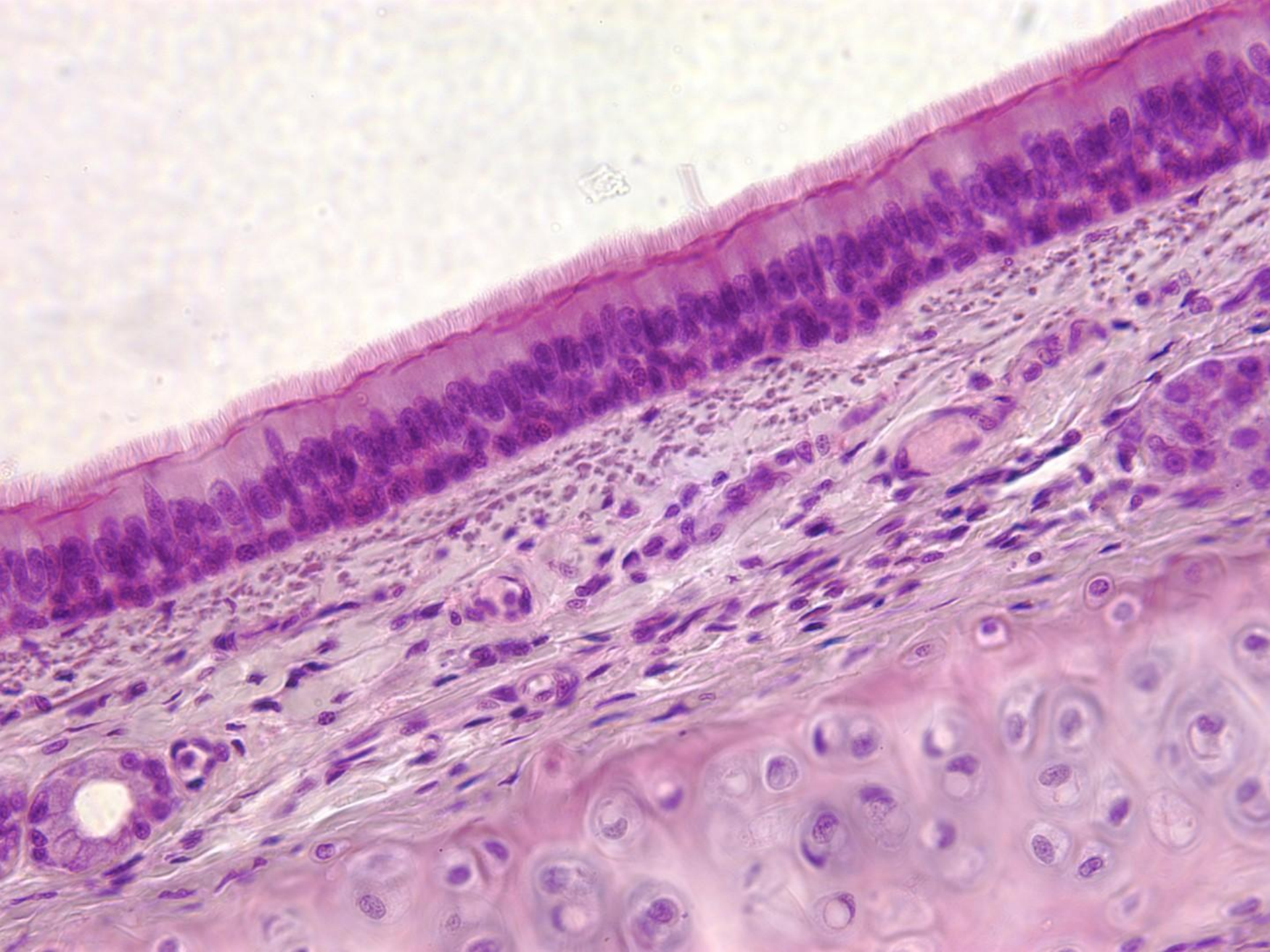


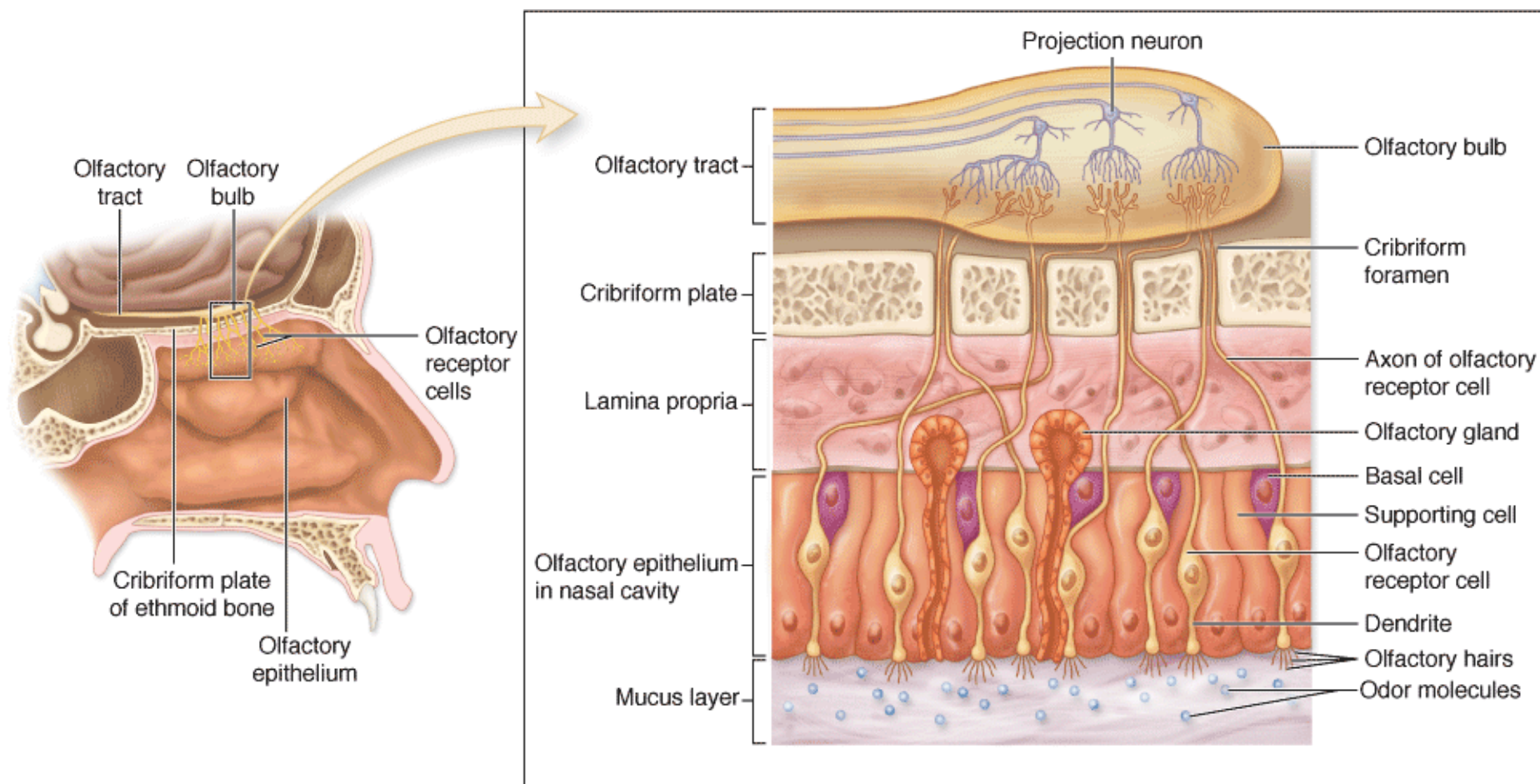


Respiratory Epithelium tissue

- ▶ Lined with ciliated pseudostratified columnar epithelium known as **respiratory epithelium**
 - ▶ **Ciliated columnar cells** : 300 cilia on its apical surface
 - ▶ **Goblet cells** : mucin glycoproteins
 - ▶ **Brush cells** : chemosensory receptors
 - ▶ **Small granule cells** : diffuse neuroendocrine system
 - ▶ **Basal cells** : stem cells that give rise to the other cell types



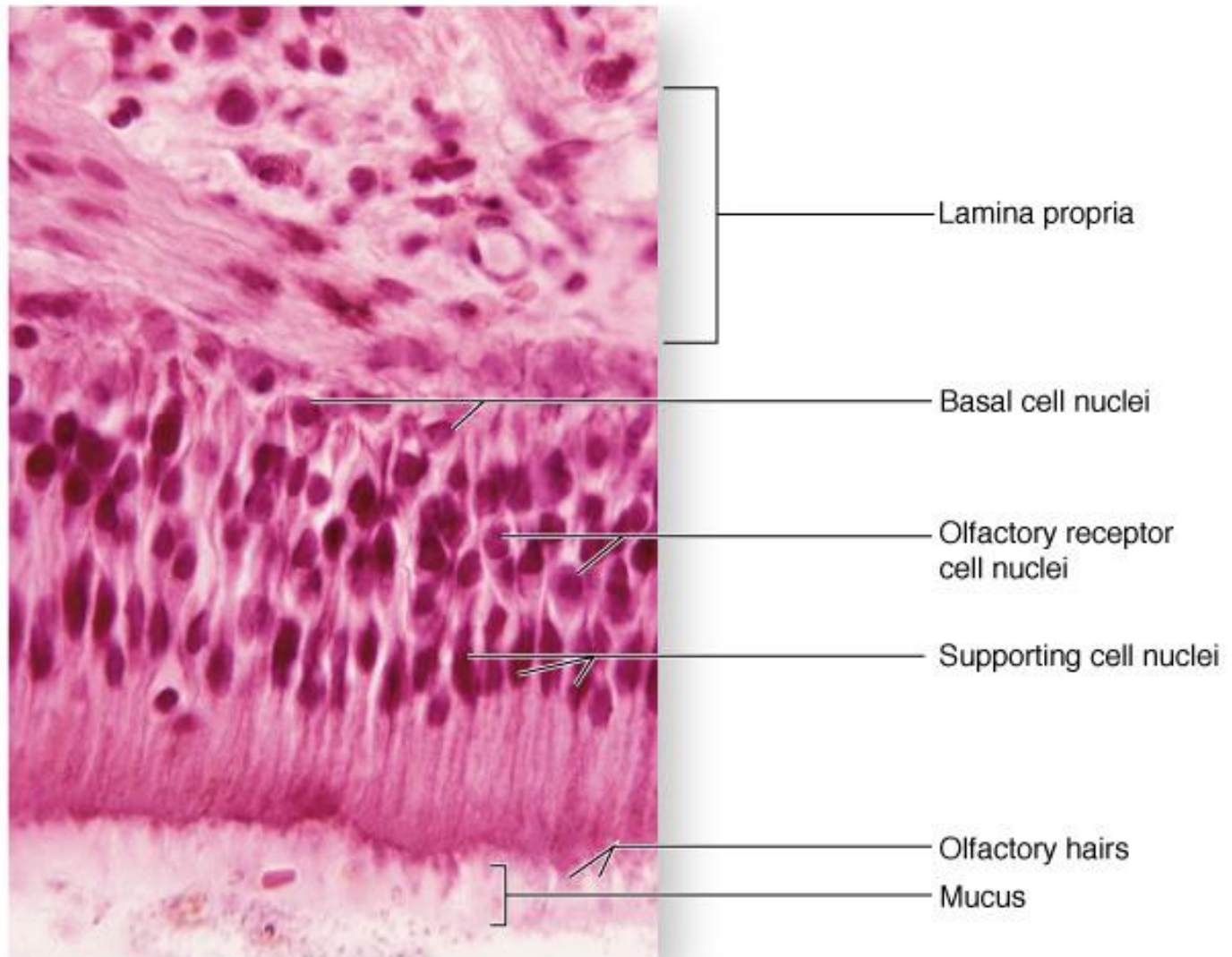




a

Source: Mescher AL: *Junqueira's Basic Histology: Text and Atlas, 12th Edition*: <http://www.accessmedicine.com>

Copyright © The McGraw-Hill Companies, Inc. All rights reserved.

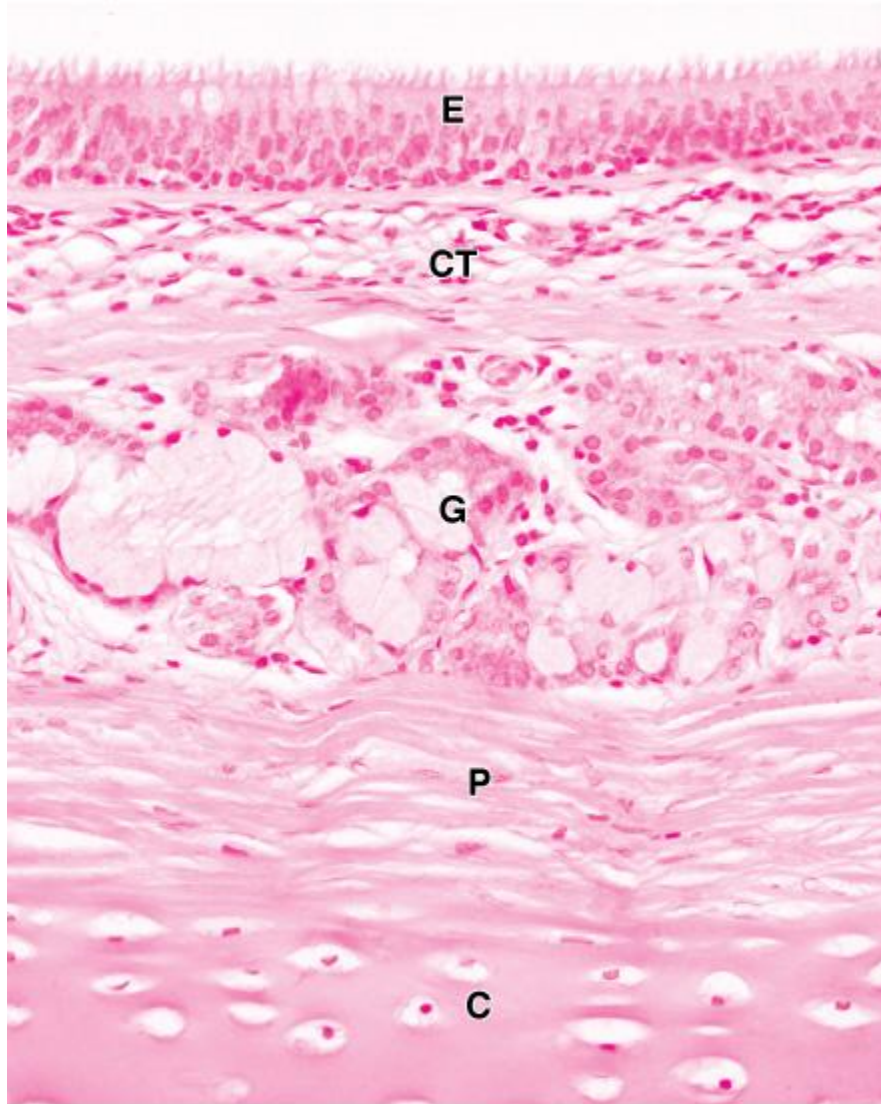


b

Source: Mescher AL: *Junqueira's Basic Histology: Text and Atlas, 12th Edition*: <http://www.accessmedicine.com>

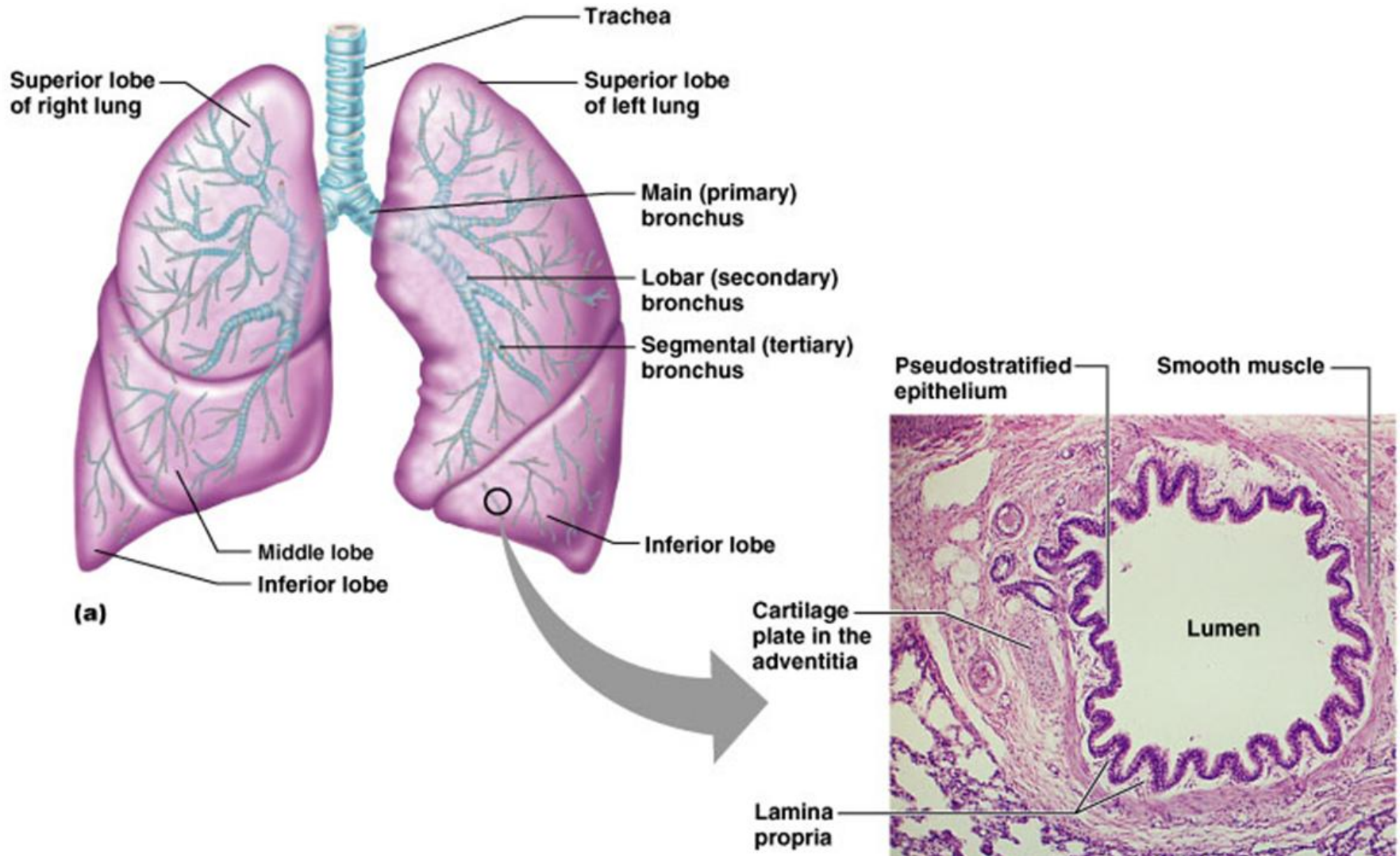
Copyright © The McGraw-Hill Companies, Inc. All rights reserved.

Trachea

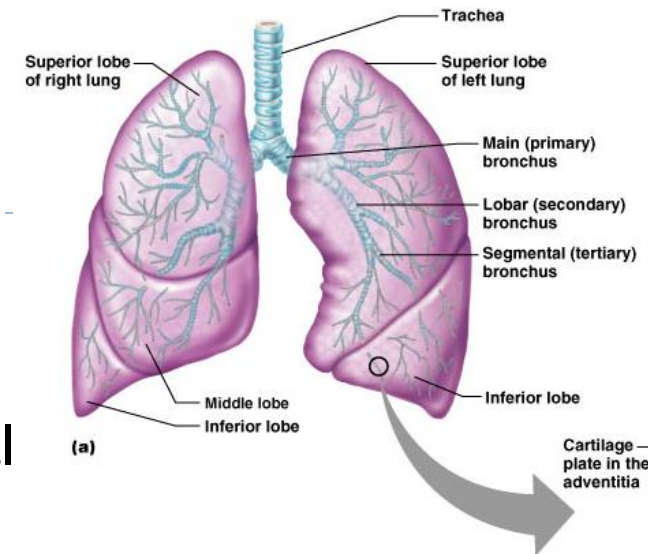


respiratory epithelium (E)
underlain by connective
tissue (CT) and seromucous
glands (G) in the lamina
propria. The submucosa
contains C-shaped rings of
hyaline cartilage (C) covered
by perichondrium (P).

Bronchial tree



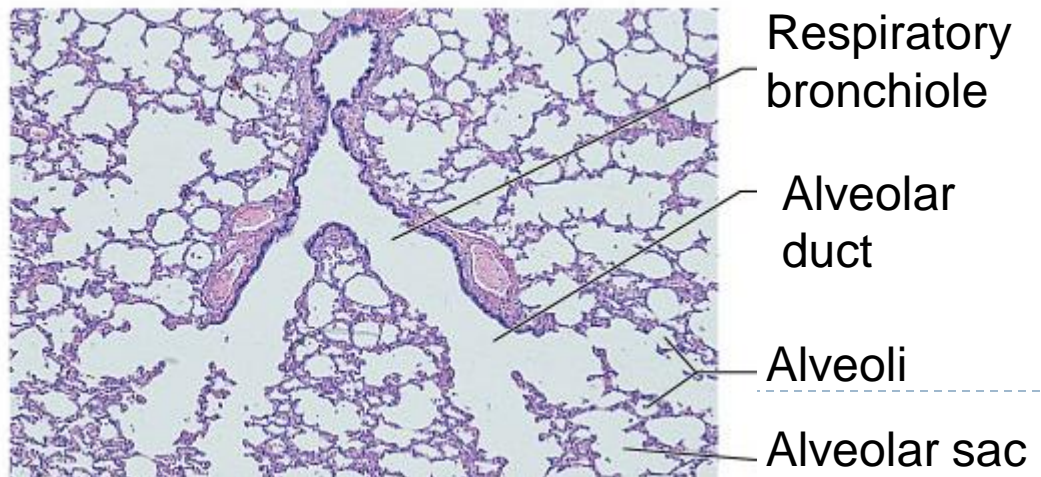
- ▶ **3 Lobe on the right**
- ▶ **2 on the left**
- ▶ Lobar bronchi branch into tertiary = segmental
- ▶ Continues dividing: about 23 times
- ▶ Tubes smaller than 1 mm called bronchioles
- ▶ Smallest, terminal bronchioles, are less the 0.5 mm diameter
- ▶ Tissue changes as becomes smaller
 - ▶ **Cartilage plates, not rings, then disappears**
 - ▶ **Pseudostratified columnar to simple columnar to simple cuboidal without mucus or cilia**
 - ▶ **Smooth muscle important: sympathetic relaxation (“bronchodilation”), parasympathetic constriction (“bronchoconstriction”)**



Gas Exchange

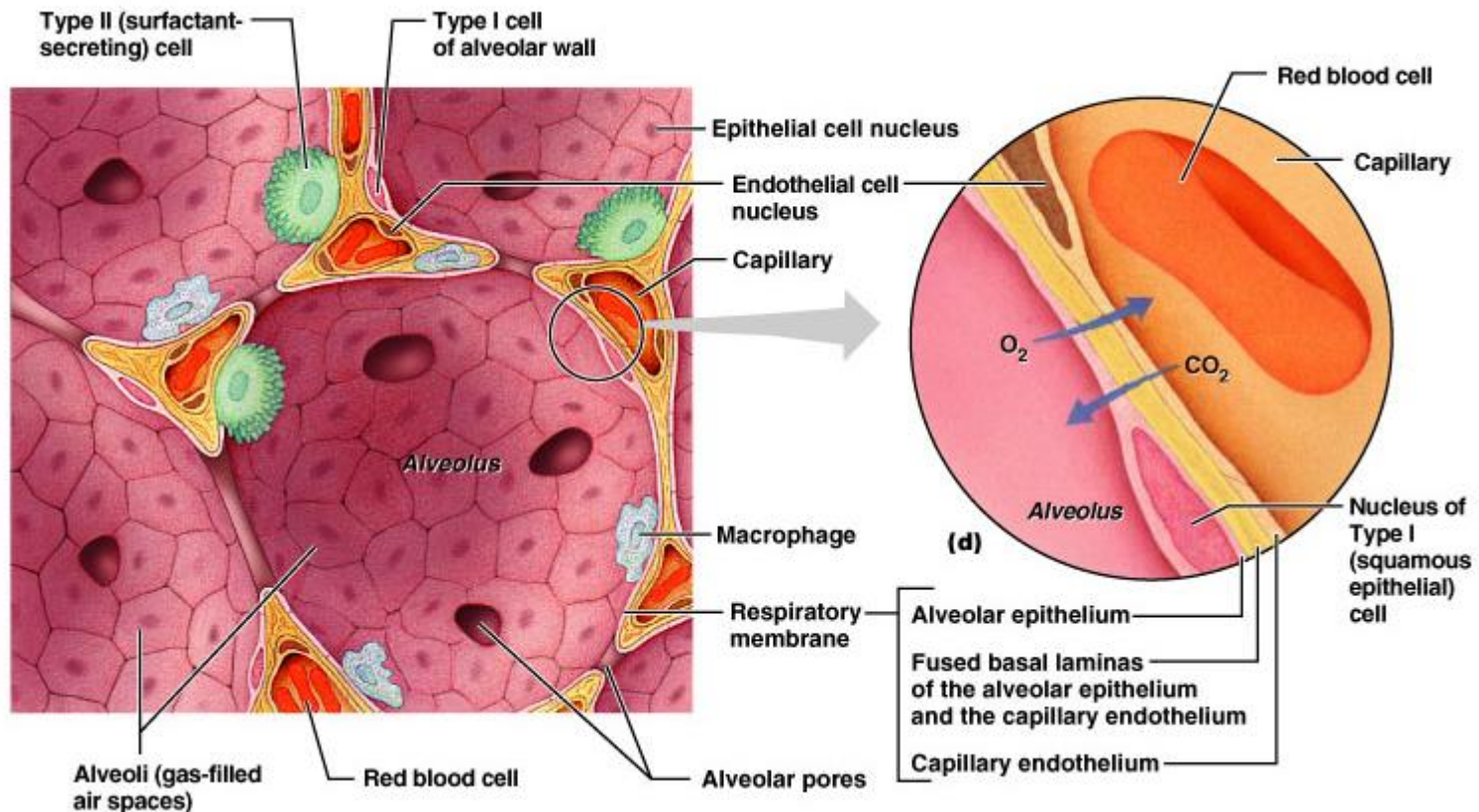
- ▶ Air filled alveoli account for most of the lung volume
- ▶ Very great area for gas exchange (1500 sq ft)
- ▶ **Alveolar wall**
 - ▶ Single layer of squamous epithelial cells (type I cells) surrounded by basal lamina
 - ▶ 0.5um (15 X thinner than tissue paper)
 - ▶ External wall covered by cobweb of capillaries
- ▶ ***Respiratory membrane***: fusion of the basal laminas of
 - ▶ Alveolar wall
 - ▶ Capillary wall

(air on one side; blood on the other)



Microscopic detail of alveoli

- ▶ Alveoli surrounded by fine elastic fibers
- ▶ Alveoli interconnect via alveolar pores
- ▶ Alveolar macrophages – free floating “dust cells”
- ▶ Note type I and type II cells and joint membrane



Extra Material

- ▶ <http://www.youtube.com/watch?v=TQ24-WCsYN4>
- ▶ http://www.youtube.com/watch?v=Y_S5W4iXigl
- ▶ http://www.youtube.com/watch?v=SPGRkexl_cs

