

# *RESPIRATORY SYSTEM (I)*

## **Histology of the Upper Respiratory Tract, and Trachea & Primary bronchi**

# Objectives:

By the end of this lecture the student should be able to describe the microscopic structures of:

- **Vestibule** of the nasal cavity.
- **Respiratory mucosa** of the nasal cavity.
- **Nasal septum**.
- **Olfactory mucosa** of the nasal cavity.
- **Mucosa of the paranasal sinuses**.
- **Larynx**.
- **The microscopic structures of the wall of:**
  - Trachea.
  - Primary or extra-pulmonary bronchi.

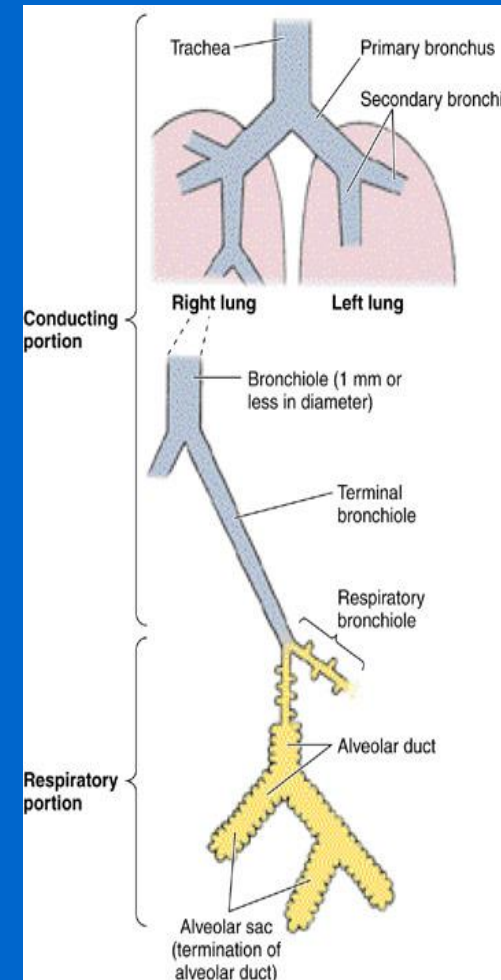
# RESPIRATORY SYSTEM

## *(A) Conducting portion :*

- 1- Nasal cavity.
- 2- Nasopharynx.
- 3- Larynx.
- 4- Trachea.
- 5- Primary bronchi (extrapulmonary bronchi).
- 6- Intrapulmonary bronchi:
  - 2ry bronchi (lobar bronchi).
  - 3ry bronchi (segmental bronchi).
- 7- Primary bronchioles (preterminal bronchioles).
- 8- Terminal bronchioles.

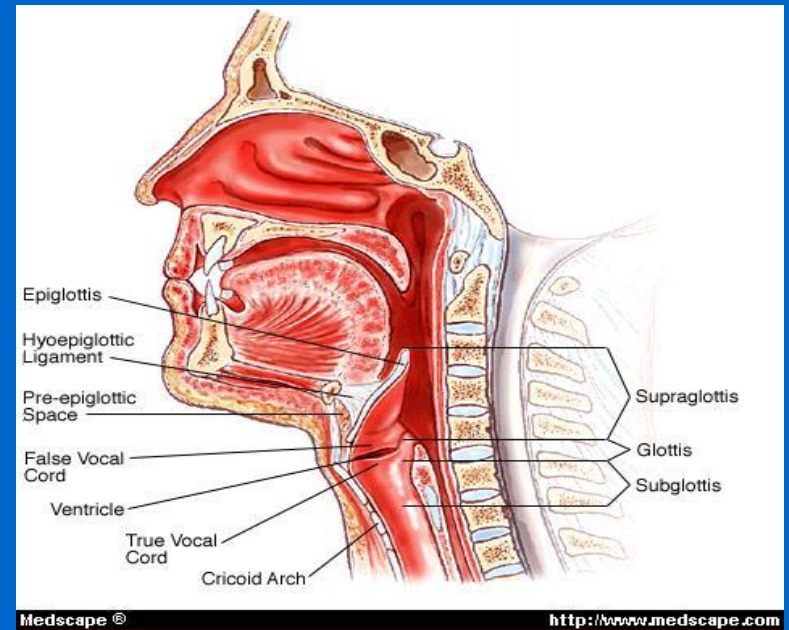
## *(A) Respiratory portion:*

- 1- Respiratory bronchioles.
- 2- Alveolar ducts .
- 3- Alveolar sacs.
- 4- Pulmonary alveoli.



# NASAL CAVITY (N.C.)

1. Anterior portion of N.C.:  
**Vestibule.**
2. Posterior portion of N.C.:
  - a- **Respiratory region.**
  - b- **Olfactory region.**



N.B. The nasal septum divides the nasal cavity into two halves (right and left).

# VESTIBULE OF N.C.

**Lining:** is lined with thin skin.

1- Epidermis: (Keratinized stratified Squamous epithelium).

2- Dermis.

**Contents:**

1- Vibrissae: stiff hairs.

2- Sebaceous glands.

3- Sweat glands.

**Wall:**

1- Hyaline cartilage.

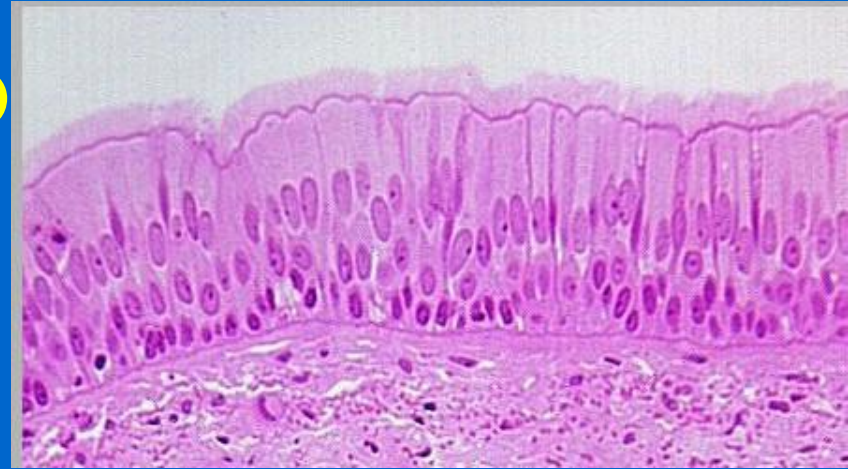
2- Cancellous (spongy) bone.

# RESPIRATORY REGION (AREA) OF NASAL CAVITY

## MUCOSA (MUCOUS MEMBRANE)

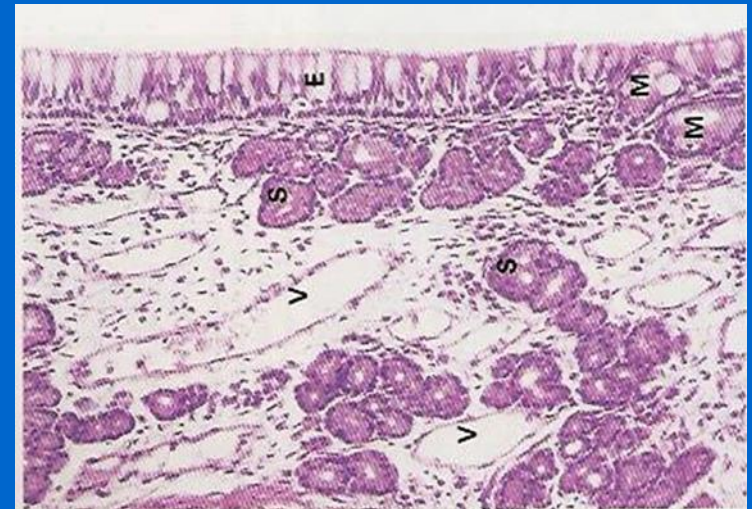
### (A) Respiratory Epithelium:

Pseudo-stratified ciliated columnar epithelium with goblet cells.



### Main Types of cells ( all touch the basement membrane)

- 1- Ciliated columnar cells.
- 2- Goblet cells.
- 3- Basal cells: are stem cells.
- 4- DNES cells: e.g. serotonin.





## (B) Lamina propria ( Sub-epithelial C.T.):

contains:

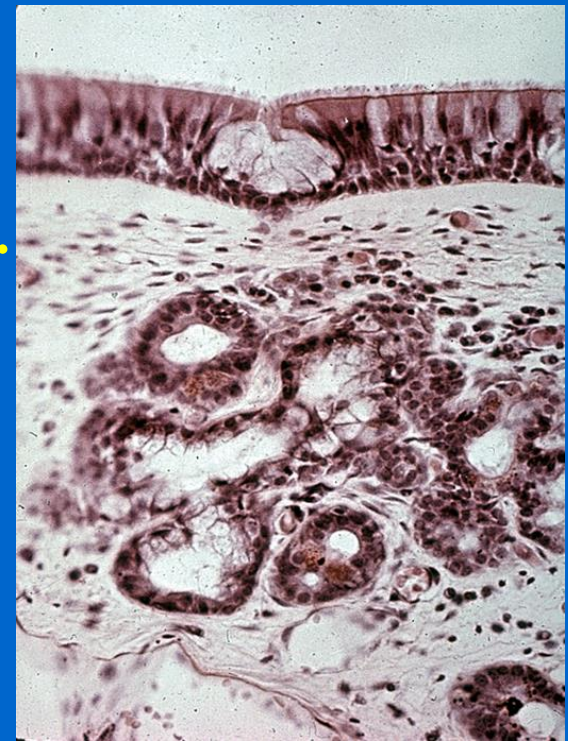
1- Large arterial plexuses &  
venous sinuses

(Highly vascularized C.T.)

2- Many seromucous glands (acini).

3- Abundant lymphoid elements:

Including occasional lymphoid  
nodules, plasma cells & mast cells.



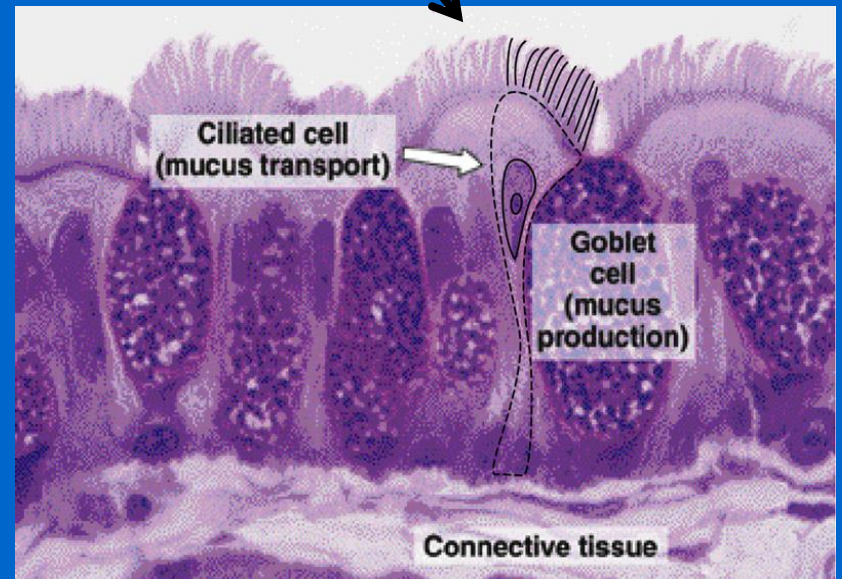
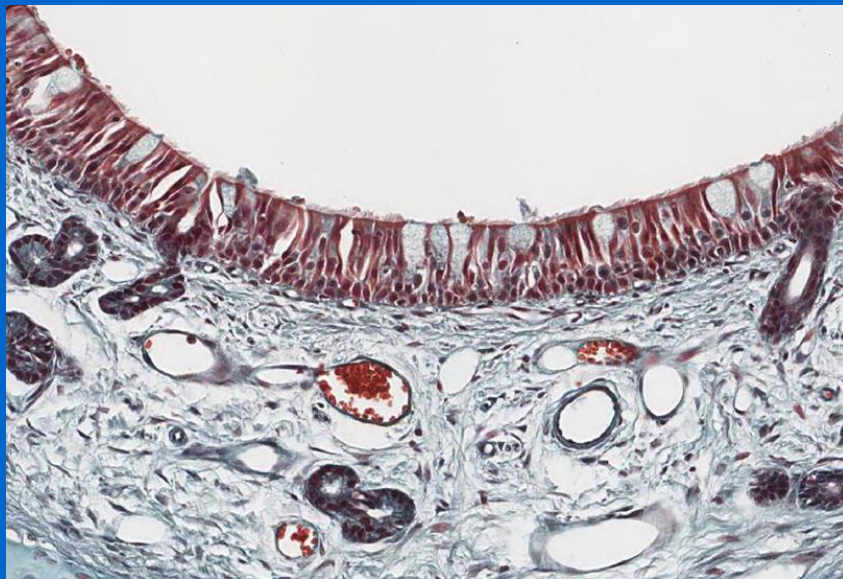
# PARANASAL SINUSES

**Lining:** 1- Respiratory epith. (Mention.....)

2- Lamina propria.

**CLINICAL APPLICATION:**

Sinusitis.





# OLFACTORY REGION (AREA) OF NASAL CAVITY (OLFACTORY MUCOSA)

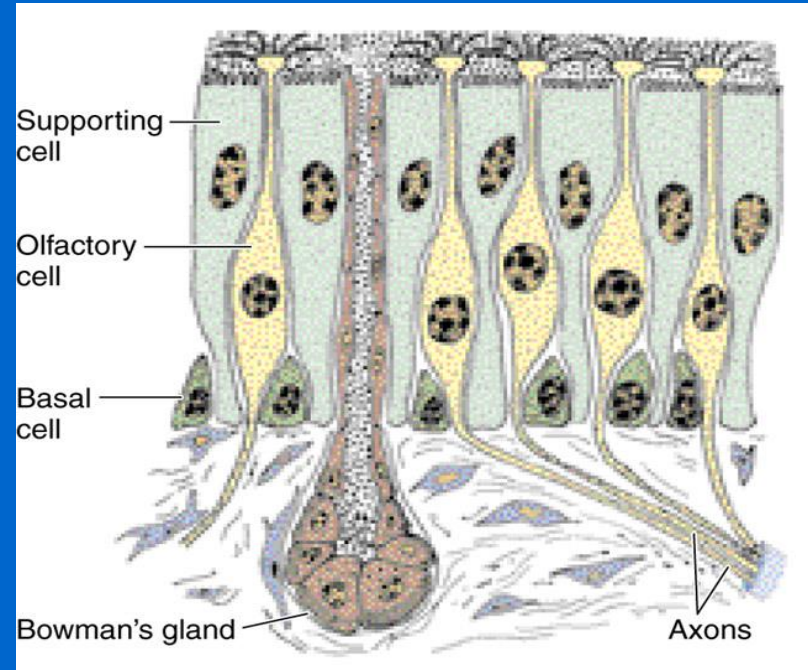
**Site:** 1-Roof of nasal cavity.  
2-Upper part of nasal septum.  
3-over superior concha.

## **Structure:**

### **(A) Olfactory epithelium:**

#### **Pseudo-stratified columnar epith.**

- 1- **Olfactory cells** (olfactory nerve cells)
- 2- **Sustentacular** (supporting) **cells.**
- 3- **Basal cells:** Pyramidal in shape, basal in position and act as stem cells.



# OLFACTORY EPITHELIUM

## 1- Olfactory cells:

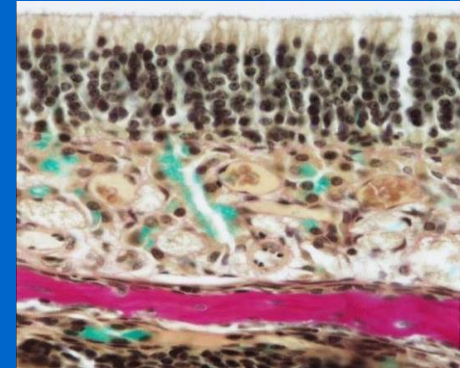
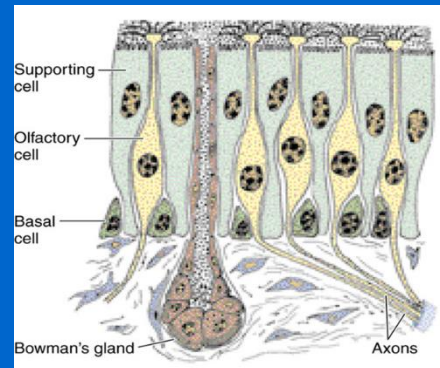
Are bipolar neurons

**Dendrite** has olfactory vesicle that has nonmotile cilia.

**Axons** are unmyelinated with Schwann-like cells.

Axons will collect in the lamina propria to form bundles of nerve fibers.

Bundles will collect to form the olfactory nerve.



## 2- Sustentacular (supporting) cells:

Are columnar cells.

**Function:**

Physical support and nourishment for olfactory cells.

**(B) Lamina propria:** contains:

1- Highly (richly) vascularized loose C.T.

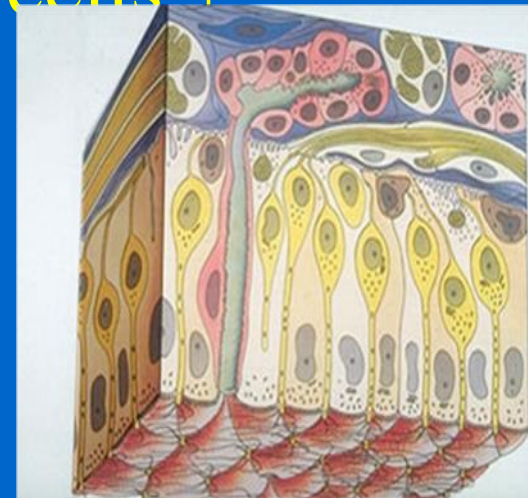
2- Contents:

a) Bowman's glands ( olfactory glands) :  
are serous acini.

b) Bundles of unmyelinated nerve fibers:  
Are axons of olfactory nerve cells +  
Schwann-like cells (glial cells).

c) Rich vascular plexus.

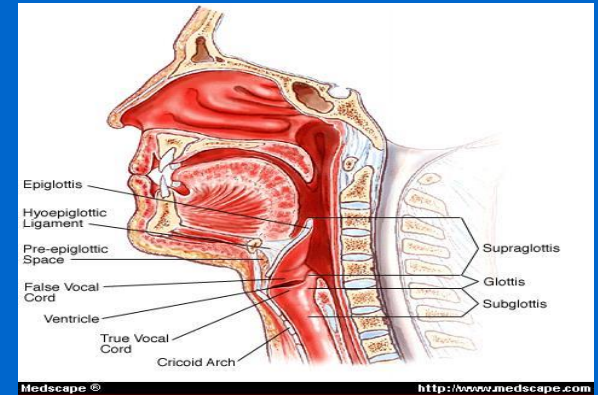
d) Numerous lymphoid elements.



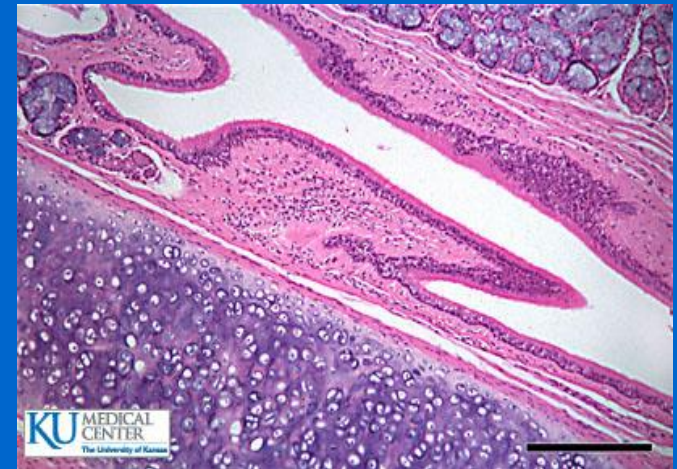
# LARYNX

## (A) Mucosa (Mucous membrane ):

- 1- Epithelium.
- 2- Lamina propria.

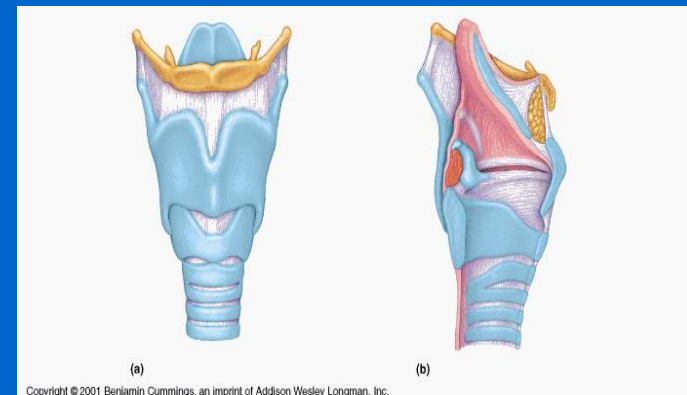


## (B) Cartilages.



## (C) Extrinsic and intrinsic muscles: all are skeletal.

## (D) Ligaments.





# LARYNX

## (A) Mucosa:

### 1- Epithelium: (2 types)

#### a- Respiratory epithelium:

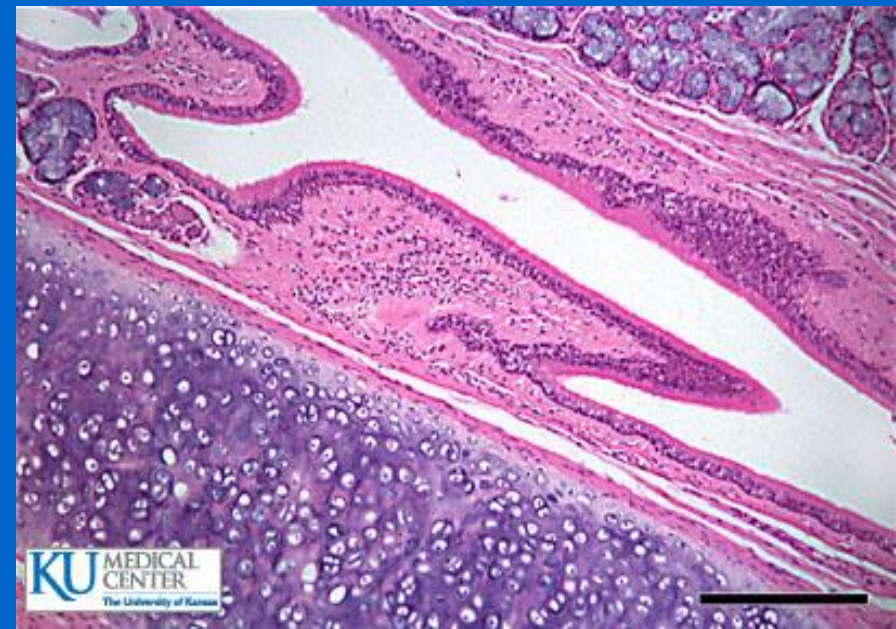
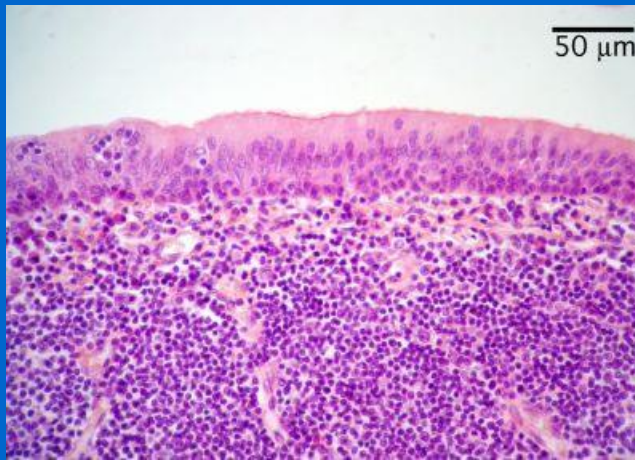
Pseudostratified ciliated columnar epithelium  
with goblet cells.

#### b- Non keratinized stratified squamous epithelium:

In: -Vocal folds.

- Superior surface of epiglottis

### 2- Lamina propria.





# LARYNX

## (A) Mucosa (cont.):

There are 2 pairs of shelf-like mucosal folds:

### 1- Vestibular folds:

Are immovable.

L/M: a- Respiratory epithelium.

b- Lamina propria:

Loose C.T. with seromucous glands  
lymphoid elements & adipose cells.

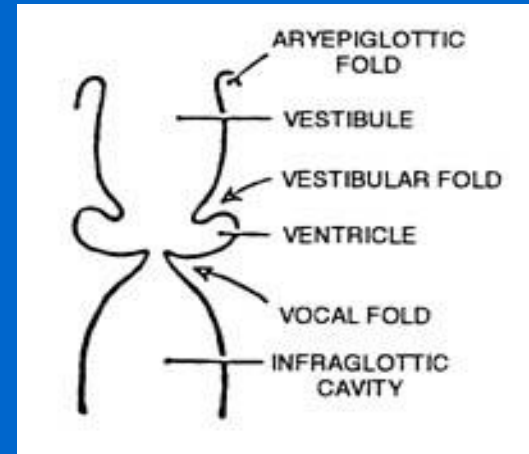
### 2- VOCAL FOLDS (CORDS): have:

a- Epithelium: non keratinized stratified squamous.

b- Lamina propria: C.T. containing bundles of elastic fibers and skeletal muscle .

**N.B. No lymphoid nodules,**

**No seromucous glands.**



# VOCAL FOLD

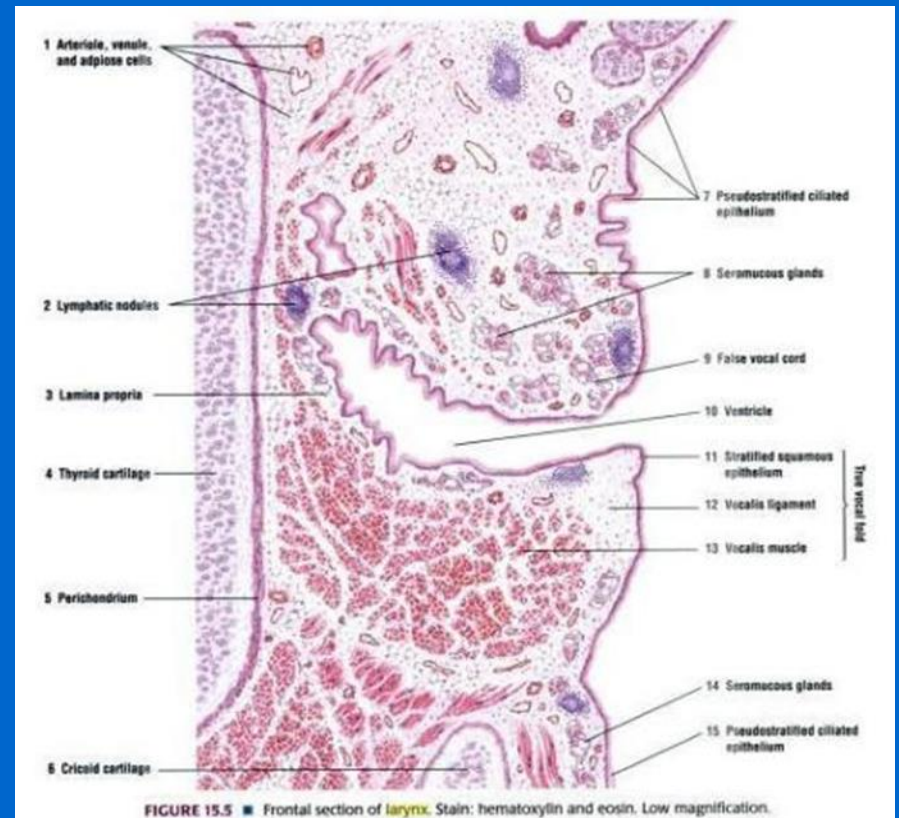
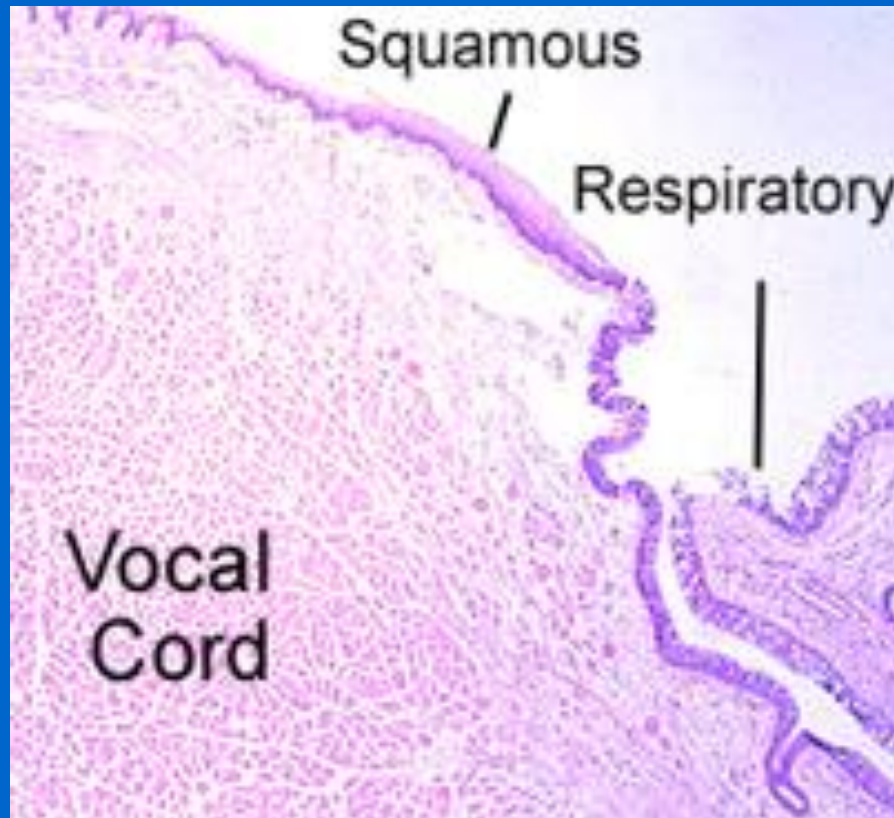
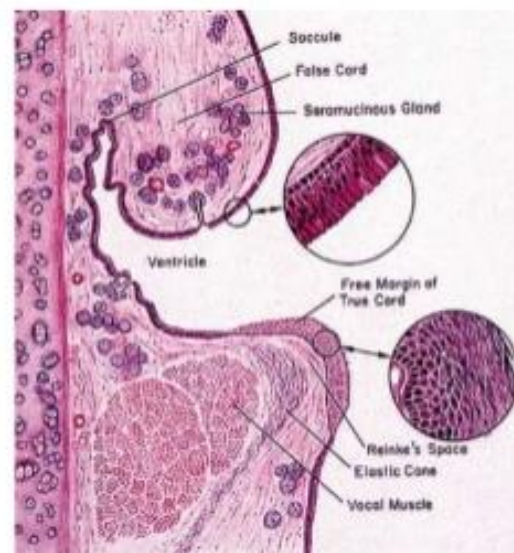


FIGURE 15.5 ■ Frontal section of larynx. Stain: hematoxylin and eosin. Low magnification.

# VOCAL FOLDS

## HISTOLOGY

- Histology of Supraglottis
- Epithelium
- Mucous glands
- Rich vascularity & lymphatic
- Histology of Glottis
- Epithelium
- Lamina propria – 3 layers
- Muscle layer- vocalis
- No mucous gland in free edge of vocal cord
- Cartilages



## **(B) Cartilages:**

### **1- Hyaline cartilages:**

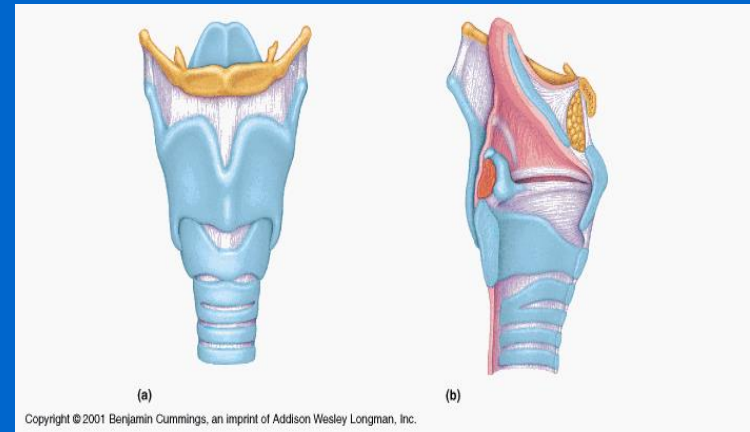
e.g. Thyroid cartilage.

### **2- Elastic cartilages:**

Epiglottis.

**(C) Muscles:** all are skeletal.

**(D) Ligaments.**

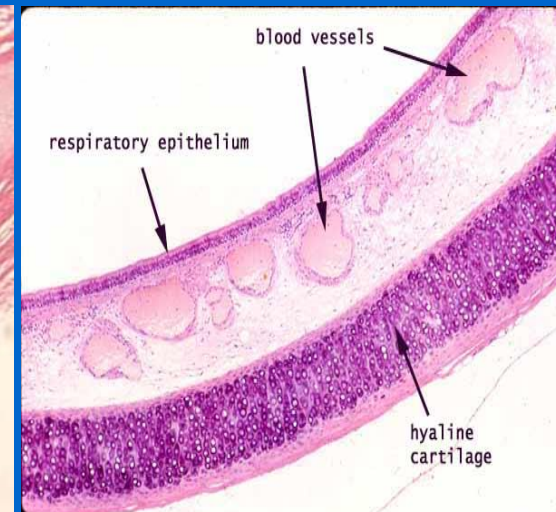
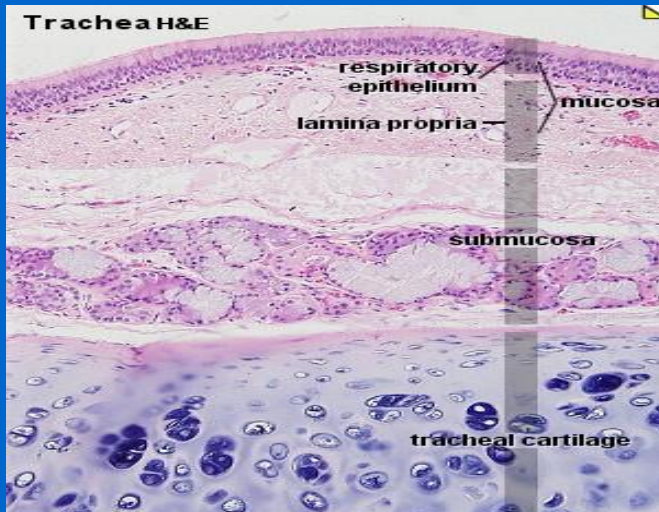




# TRACHEA

The wall of trachea is formed of:

- (1) Mucosa.
- (2) Submucosa.
- (3) Adventitia.





# MUCOSA OF TRACHEA

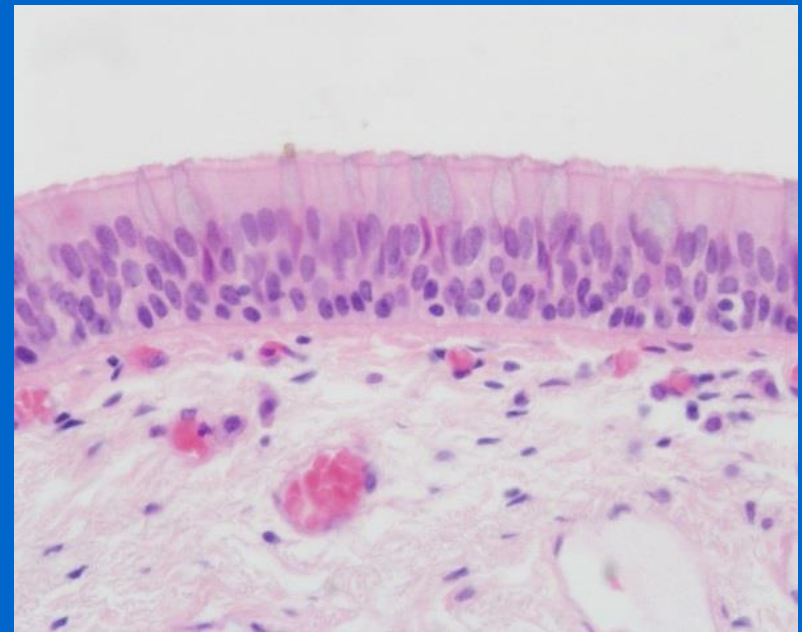
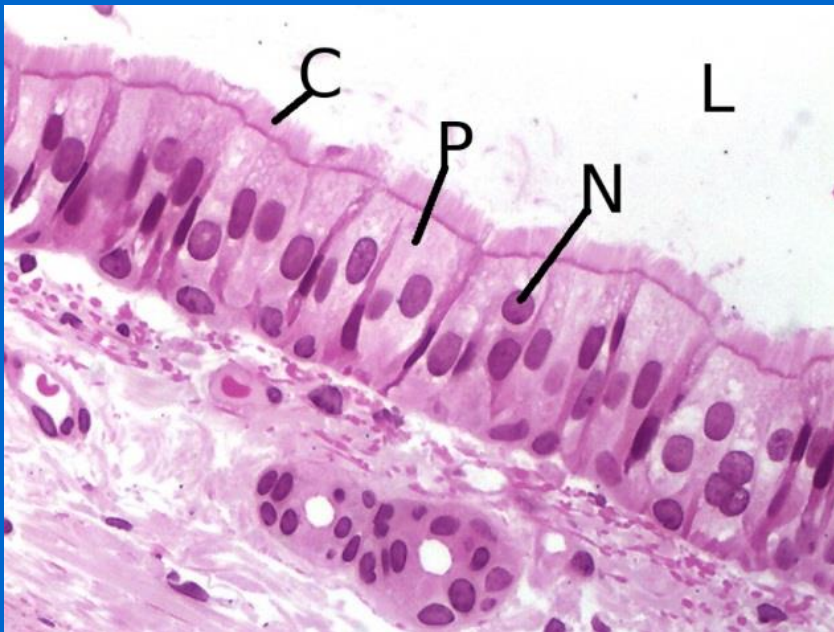
(1) **Epithelium:** Respiratory epithelium

(2) **Lamina propria.**

(3) **Elastic lamina:**

It is formed of elastic fibers.

It separates lamina propria from submucosa.



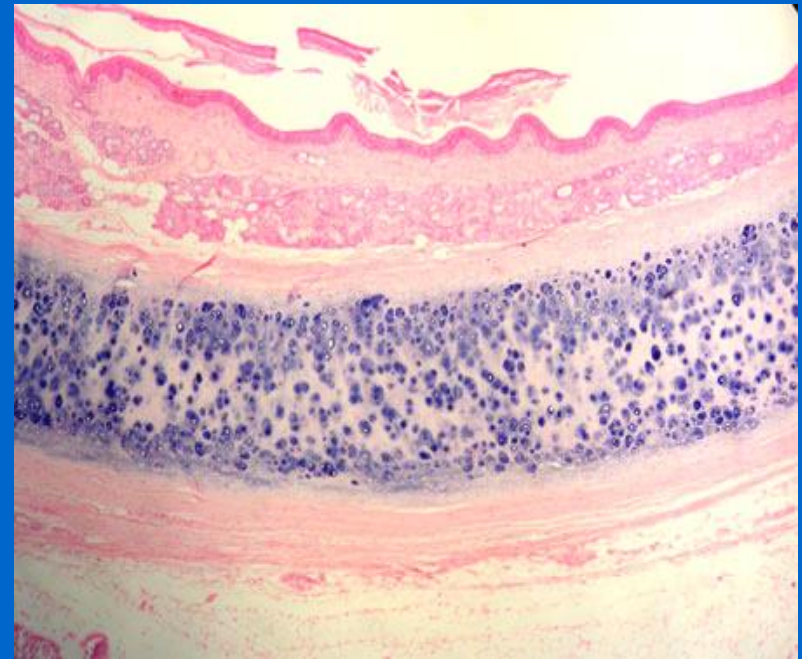
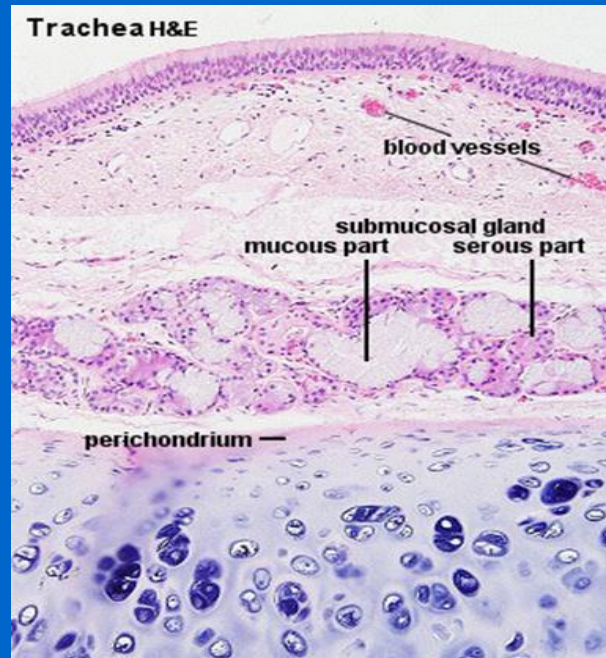
# SUBMUCOSA OF TRACHEA

Contents:

1- C.T.

2- Numerous mucous & seromucous glands.

3- Lymphoid elements.

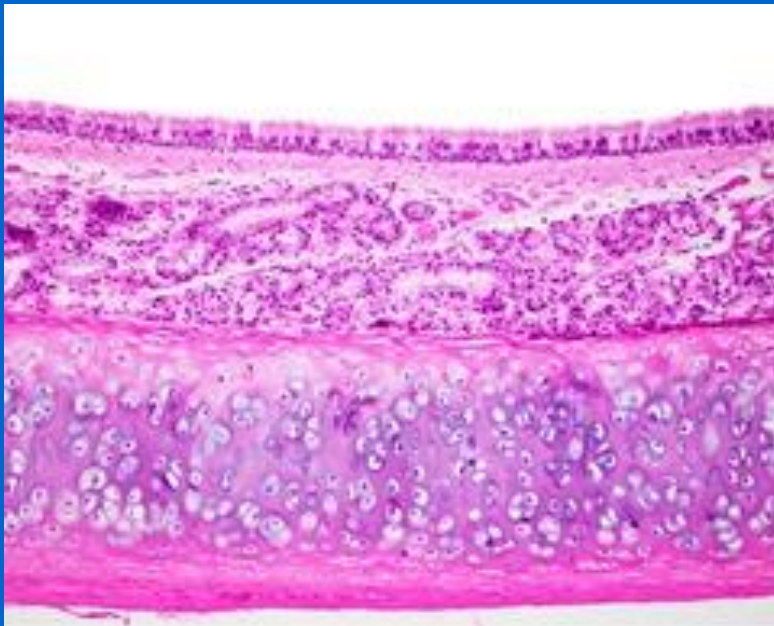


# ADVENTITIA OF TRACHEA

## Contents:

- 1- Fibroelastic C.T.
- 2- C-shaped rings (12-16) of hyaline cartilage.

Trachealis muscle (bundle of smooth muscle fibers) connects the 2 ends of each C-shaped (incomplete) rings of cartilage.



# *EXTRAPULMONARY BRONCHUS* *(1ry BRONCHUS)*

Generally have the same histological appearance as the trachea.





**THANK YOU**