

RESPIRATORY SYSTEM (I)

Histology of the Upper Respiratory Tract

**(Nasal cavity, Paranasal sinuses
and Larynx)**

Objectives:

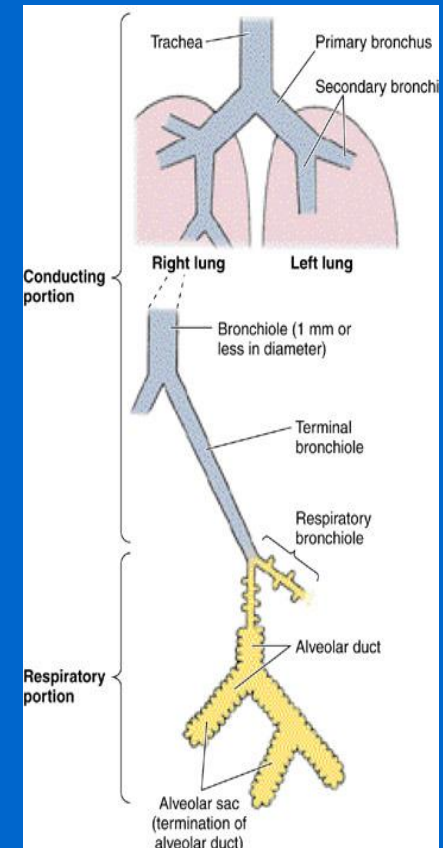
By the end of this lecture the student should be able to describe the microscopic structures of:

- **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**.

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.



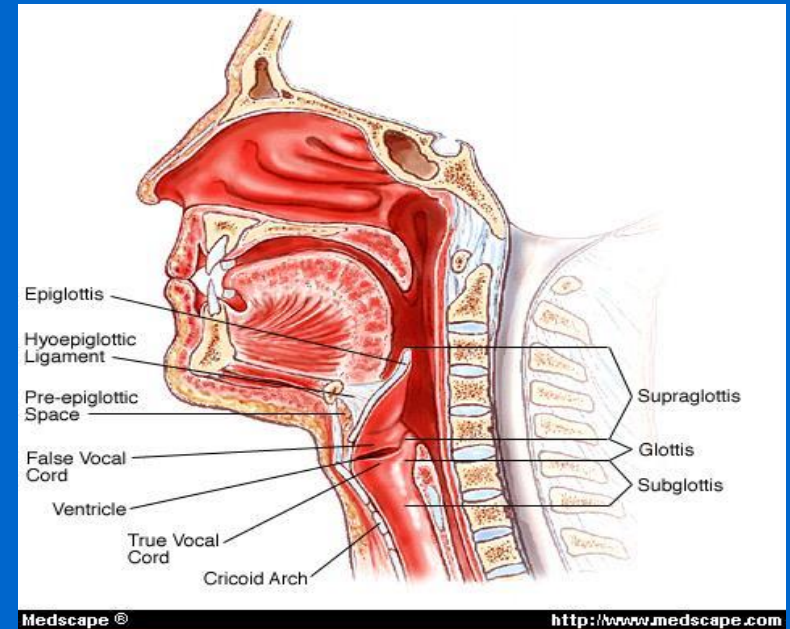
(A) Respiratory portion:

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

NASAL CAVITY (N.C.)

(1) Anterior portion of N.C.:
Vestibule.

(1) 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

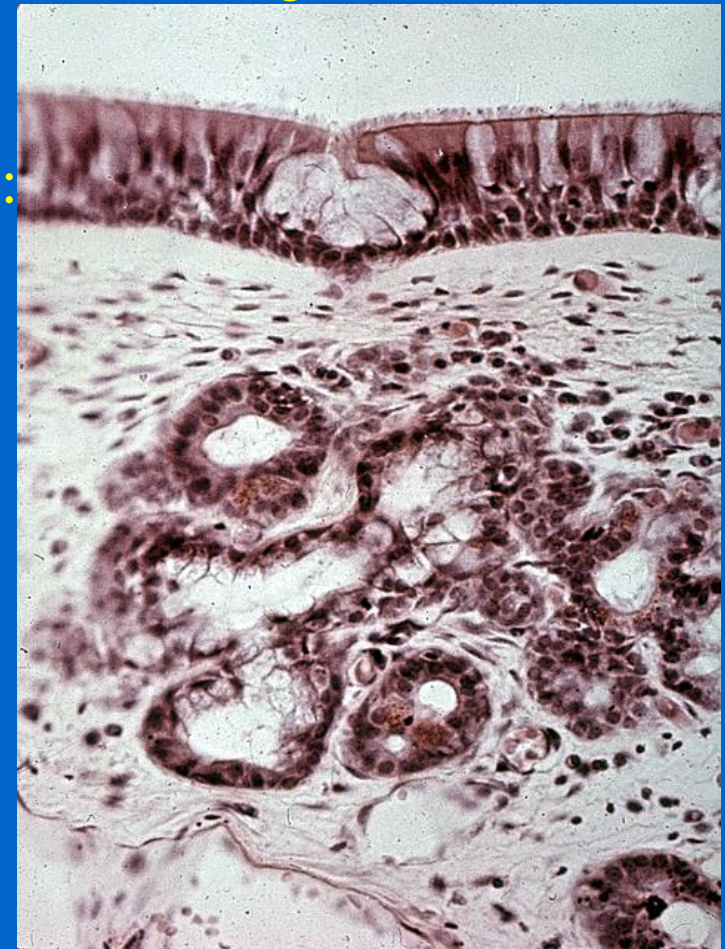
MUCOSA (MUCOUS MEMBRANE):

(A) Epithelium:

Pseudo-stratified ciliated columnar epithelium with goblet cells (Respiratory epithelium).

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

- 1- Large arterial plexuses & venous sinuses
(Highly vascularized C.T.)
- 3- Many seromucous glands (acini).
- 4- Abundant lymphoid elements:
Including occasional lymphoid nodules,
plasma cells & mast cells.

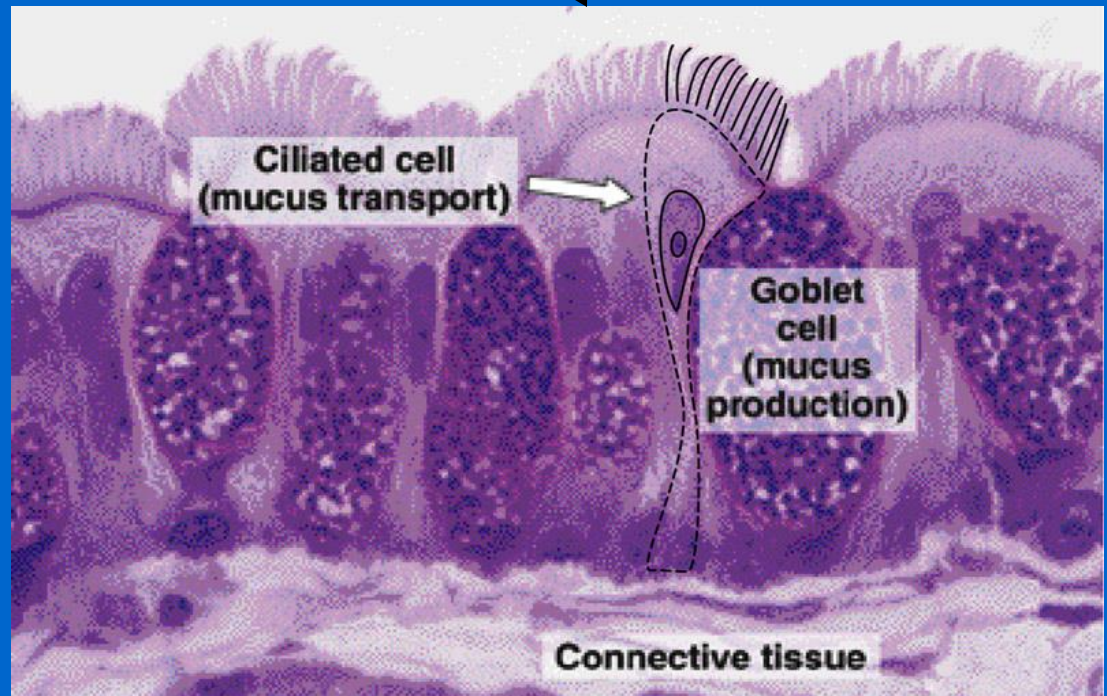


PARANASAL SINUSES

Lining: 1- Respiratory epith. (Mention.....)
2- Lamina propria.

CLINICAL APPLICATION:

Sinusitis.



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

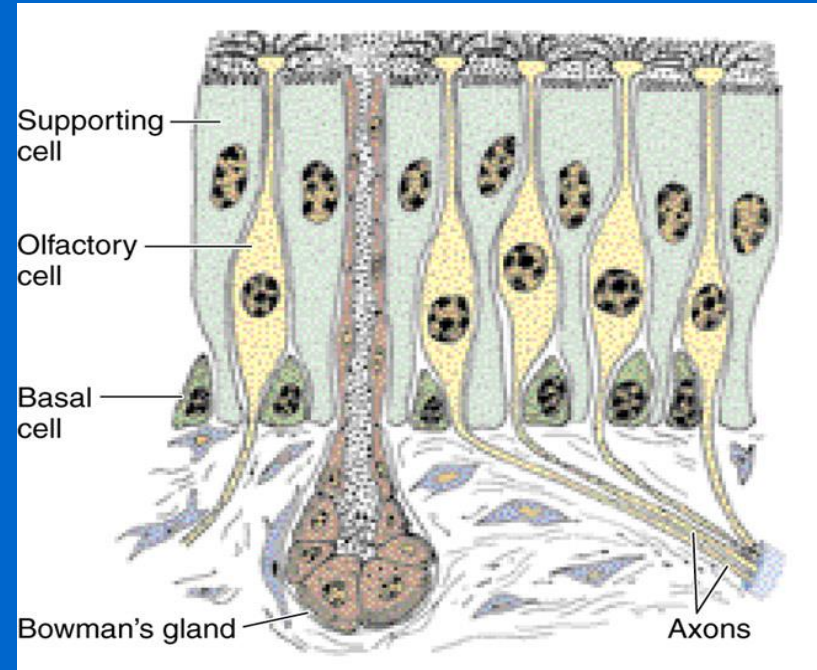
- Site:**
- 1-Roof of nasal cavity.
 - 2-Upper part of nasal septum.
 - 3-over superior concha.

Structure:

(A) Olfactory epithelium:

Pseudo-stratified columnar epithelium.

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

OLFACTORY EPITHELIUM

1- Olfactory cells:

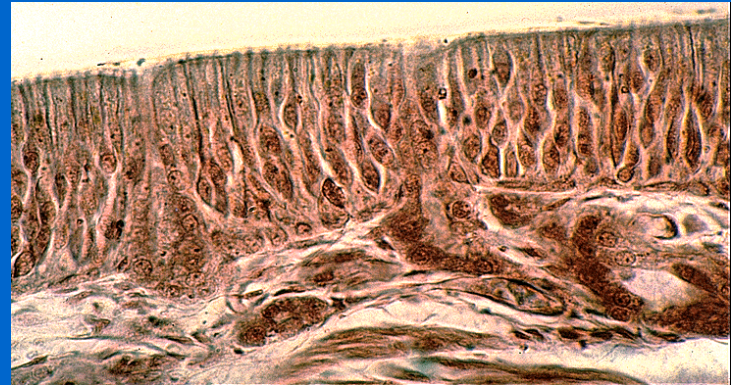
Are **bipolar neurons**

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.

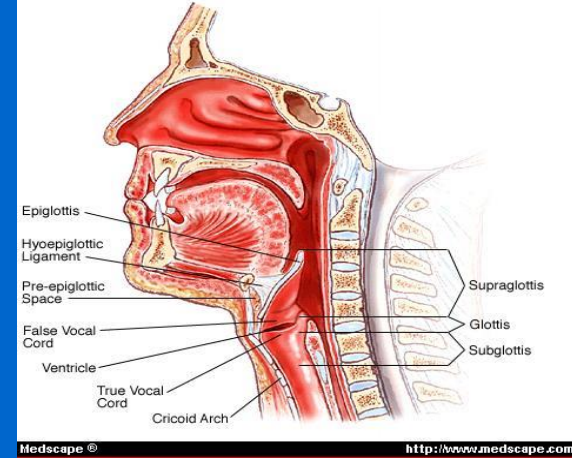
Function:

Physical support and nourishment for olfactory cells.

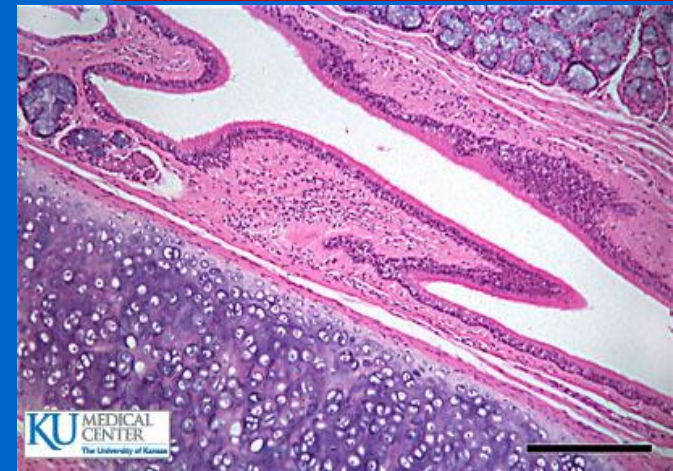
LARYNX

(A) Mucosa (Mucous membrane):

- 1- Epithelium.
- 2- Lamina propria.

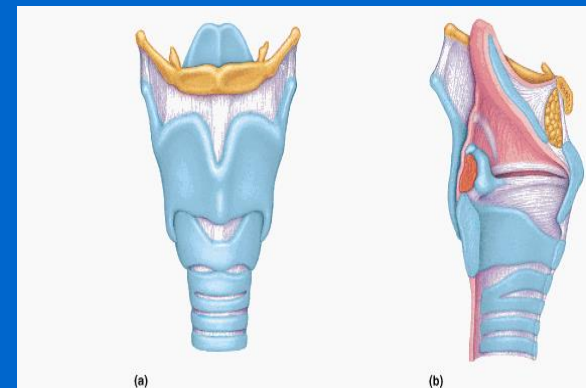


(B) Cartilages.



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

(D) Ligaments.



LARYNX

(A) Mucosa:

1- Epithelium: (2 types)

a- Respiratory epithelium:

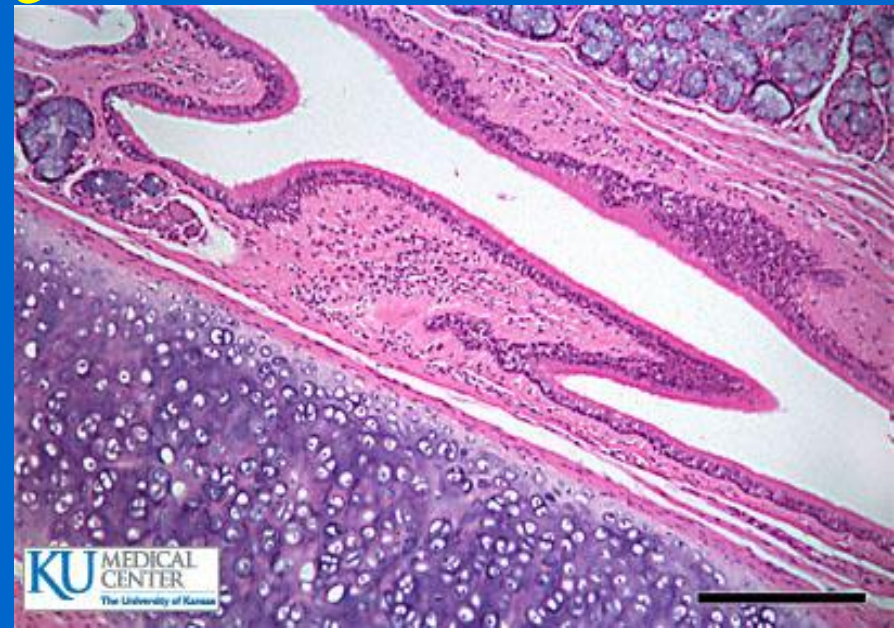
Pseudostratified ciliated columnar epithelium
with goblet cells.

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:

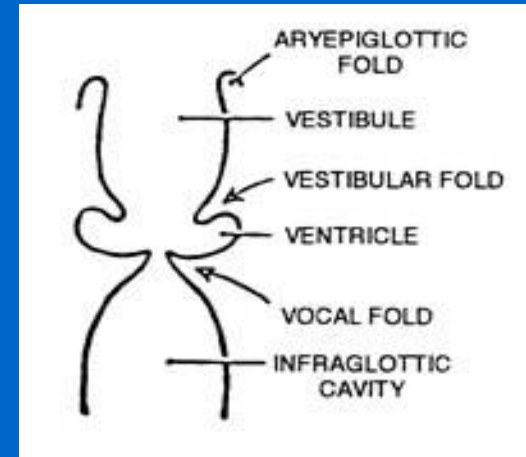
Loose C.T. with seromucous glands
lymphoid elements & adipose cells.

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.**



(B) Cartilages:

1- Hyaline cartilages:

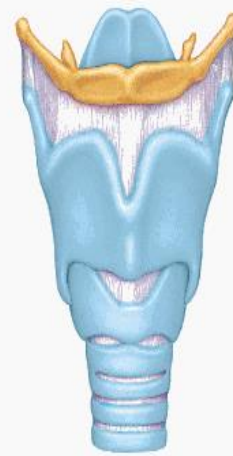
e.g. Thyroid cartilage.

2- Elastic cartilages:

Epiglottis.

(C) Muscles: all are skeletal.

(D) Ligaments.



(a)



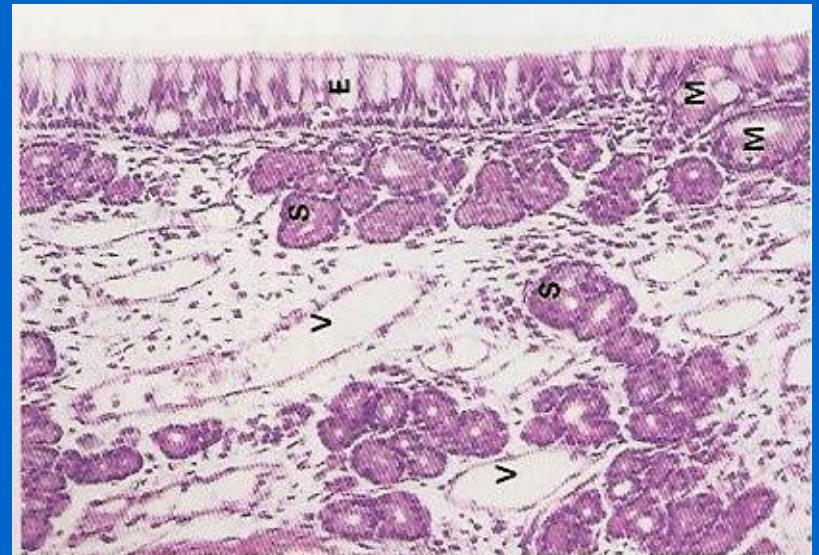
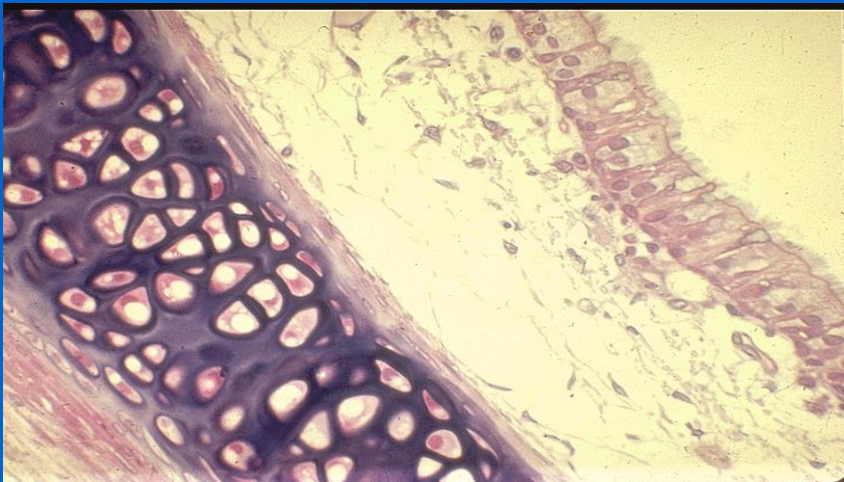
(b)

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.





THANK YOU