

وَقُلْ رَبِّ زِدْنِي عِلْمًا



RESPIRATORY SYSTEM

HAYAT BATCH

SUBJECT : _____

LEC NO. : Lecture (2)

DONE BY : Hedaya Sarsak

Histology of the nasal cavity

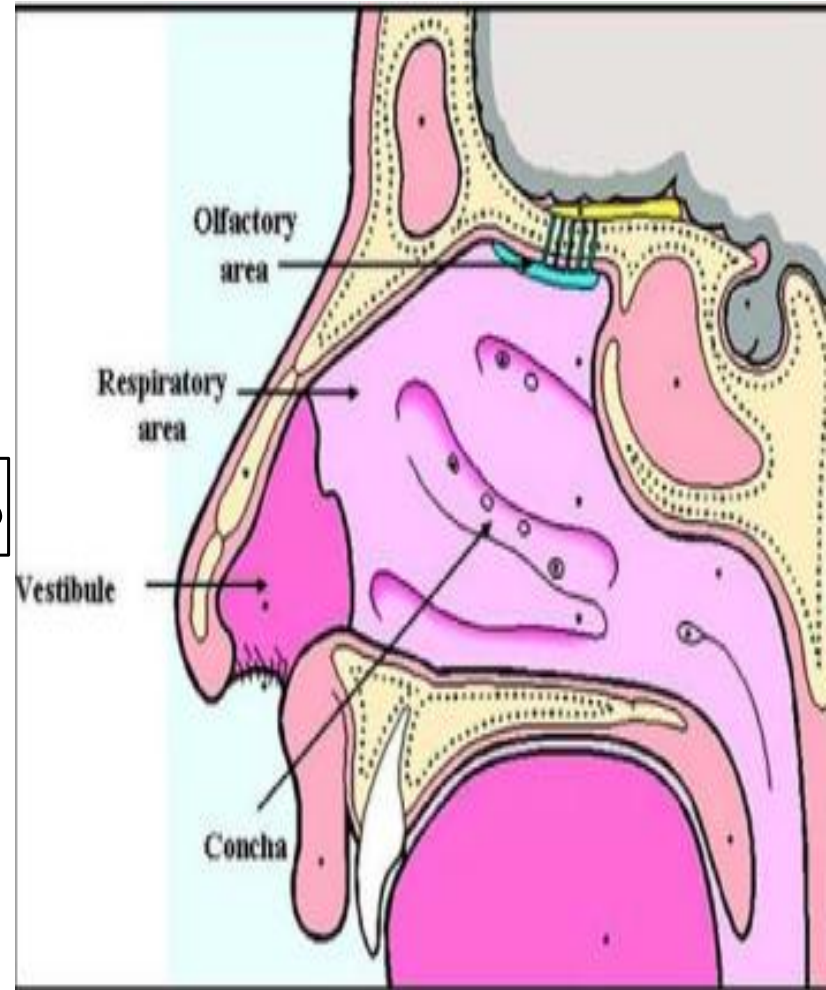
It is divided into 2 parts:

[1] Anterior part of nasal cavity (vestibule): It is the dilated anterior part of the nasal cavity.

It is lined with modified skin formed of:

1. Epidermis: lined by #
نركزنا اقتناء عن
القائمة (بيان - جلد -)
Stratified squamous keratinized epithelium with short stiff hairs (vibrissae) for filtration of the inspired air.

2. Dermis: contains sweat and sebaceous glands.



Behind vestibule

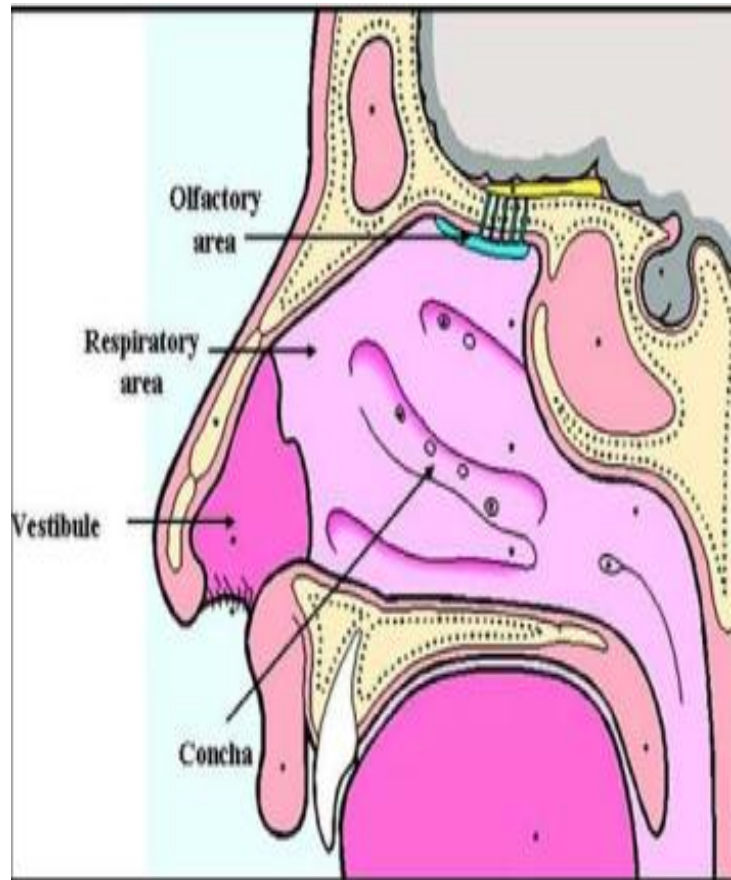
[2] Posterior part of nasal cavity : Its lateral wall contains 3 projections called conchae (superior, middle and inferior). It is divided into 2 areas, respiratory and olfactory areas.

I. Respiratory area: It is lined by mucous membrane; which is formed of:

(a) **Respiratory epithelium;** Pseudo-stratified columnar ciliated with goblet cells. \rightarrow نصفي بقاعة، بعامية

(b) **Lamina propria:** which is a dense fibroelastic connective tissue characterized by:

- 1- It is highly vascularized \rightarrow Defense Mechanism
- 2- It contains muco-serous glands to moisten the air and make a film of mucoid fluid on the surface to trap any minute foreign particles that is removed by the action of cilia.
- 3- It is rich with lymphocytes, macrophages and plasma cells (have immune function against any FBs)



↳ Responsible for smell

II. Olfactory area : present at the roof of the nasal cavity and extends on upper parts of its medial and lateral walls.

- **Lining: lined by olfactory mucosa (organ of smell) which includes olfactory epithelium and thick lamina propria**

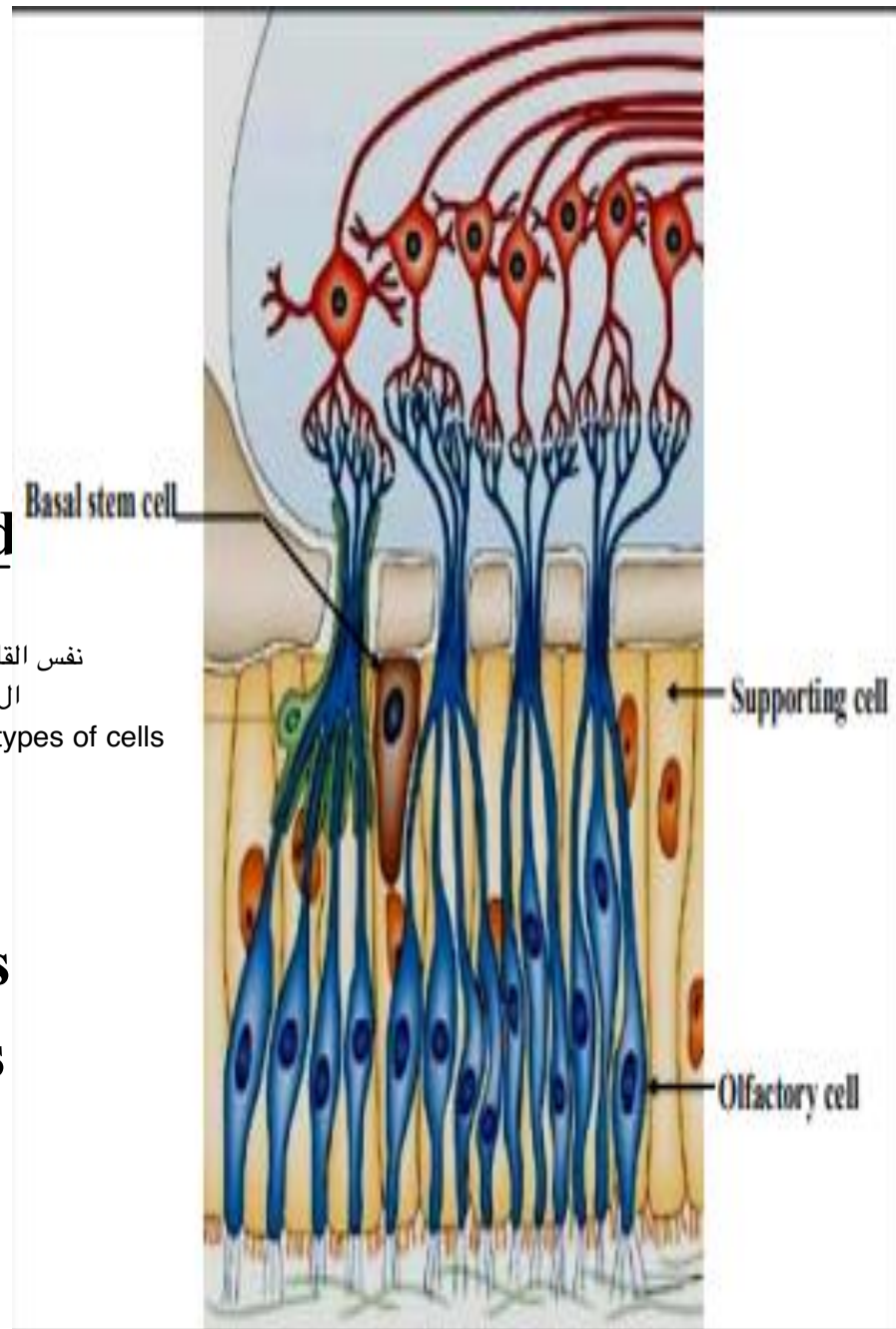
• **Olfactory epithelium:**

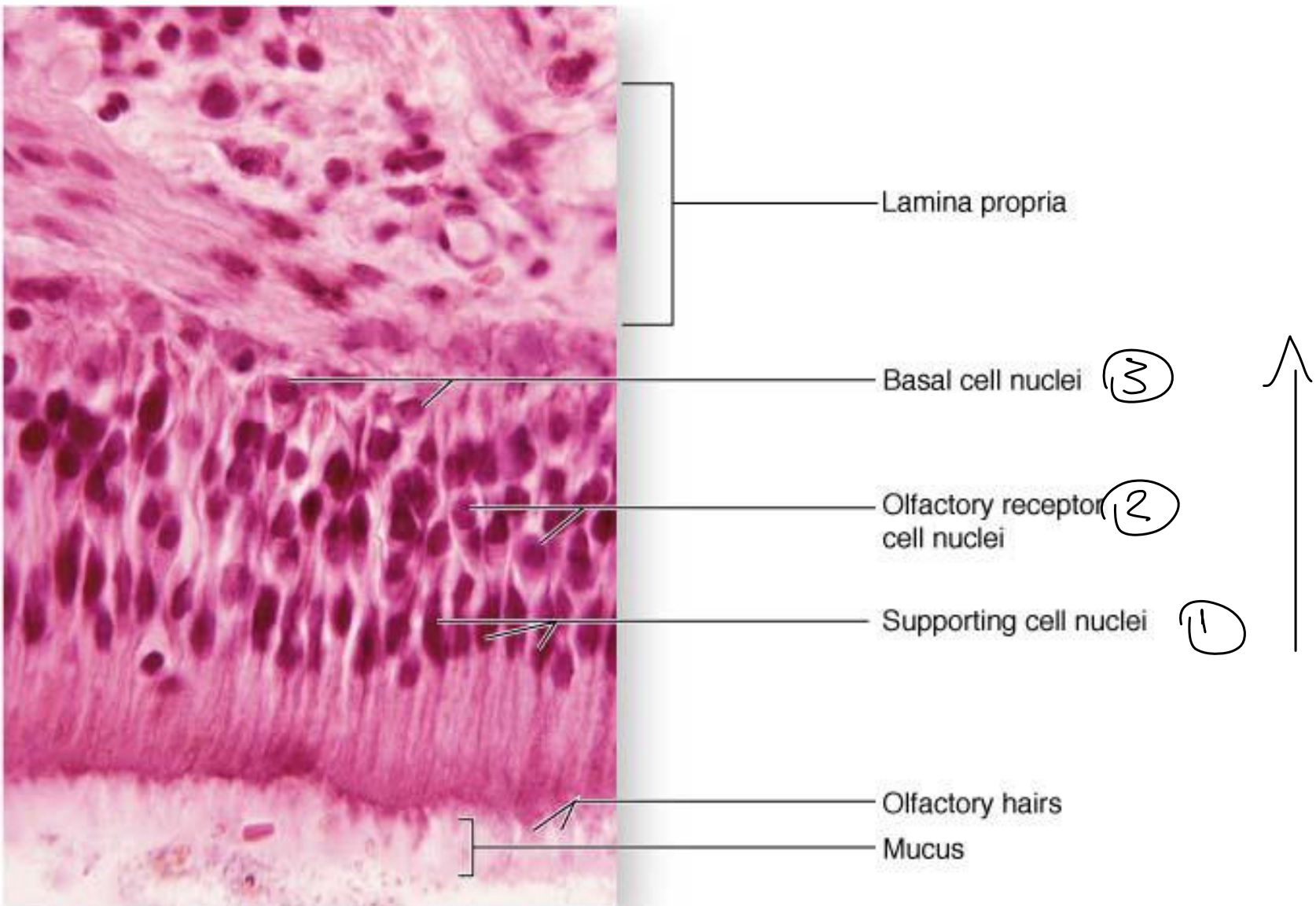
نفس القاعدة يلي حكيناها، لكن هنا الcolumnar cells صار لها differentiation into 3 types of cells

Thick pseudo stratified epithelium formed of three types of cells:

- Sustentacular (supporting) cells**
- Olfactory (chemoreceptor) cells**
- Basal (stem) cells**

↳ lamina propria بالقبج ص





b

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

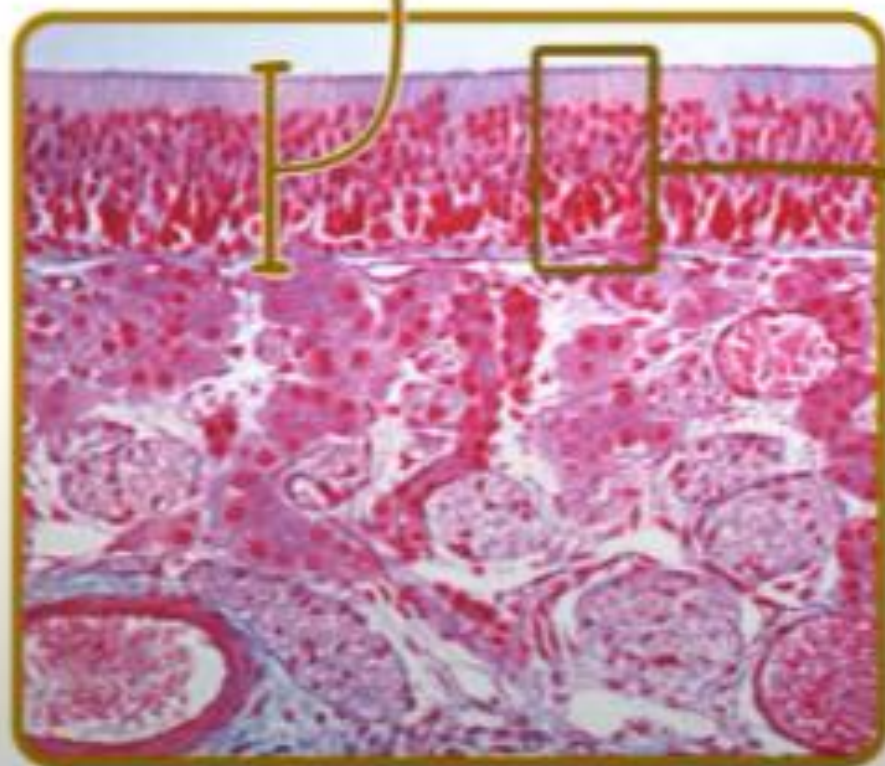
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OLFACTORY EPITHELIUM

↳ PSEUDOSTRATIFIED CILIATED
COLUMNAR CELLS

↳ olfactory, sustentacular, & basal cells

↳ lined with **OLFACTORY RECEPTORS**





Respiratory system

Larynx & Pharynx

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By the end of this lecture you must know:

- 1- Larynx (definition, extension, size and construction).**
- 2- Laryngeal ligaments and membranes.**
- 3- Laryngeal inlet and laryngeal cavity.**
- 4- Laryngeal muscles , actions and nerve supply.**
- 5- Blood supply of the larynx.**
- 6- Histology of the larynx**
- 7- Pharynx (structure, boundaries and parts).**
- 8- Pharyngeal muscles (names, action, relations and nerve supply).**
- 9- Sensory innervation of the pharynx.**
- 10- Interior of the pharynx**
- 11- Palatine tonsils (Anatomy and applied anatomy).**

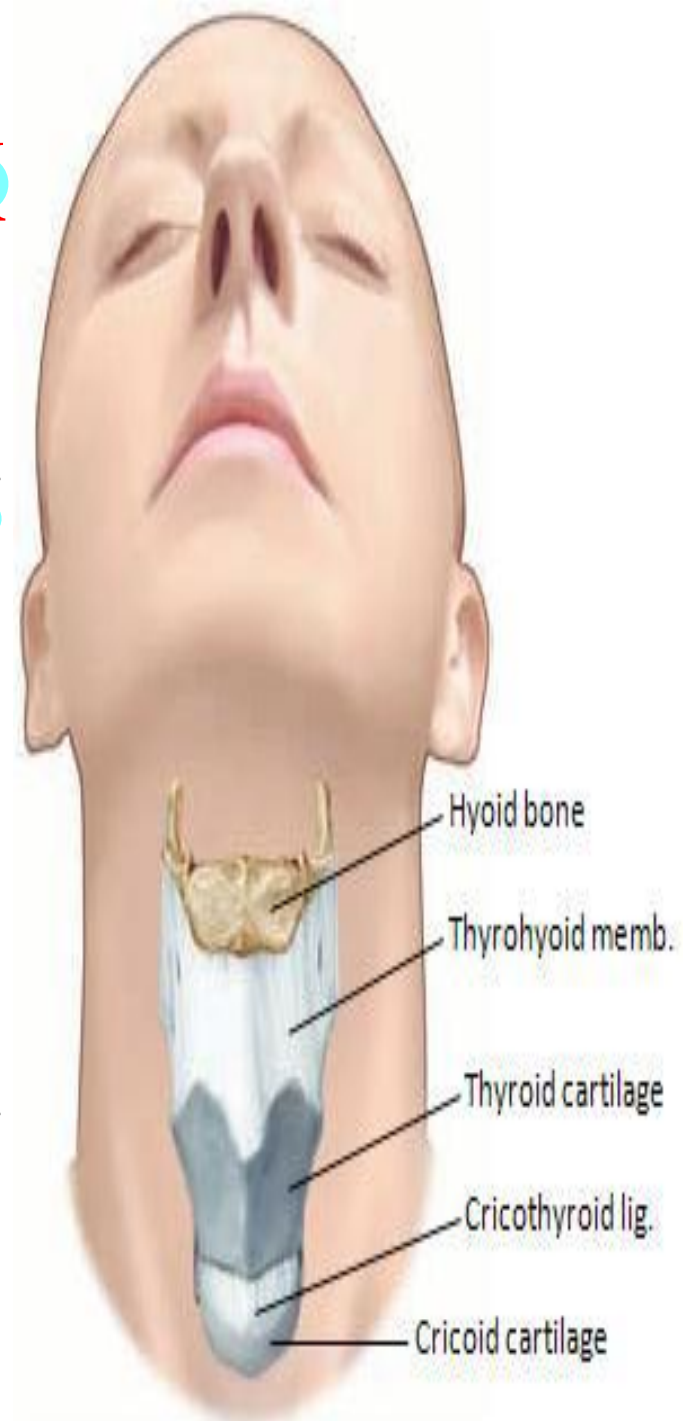
LARYNX

part of conductive system ↙

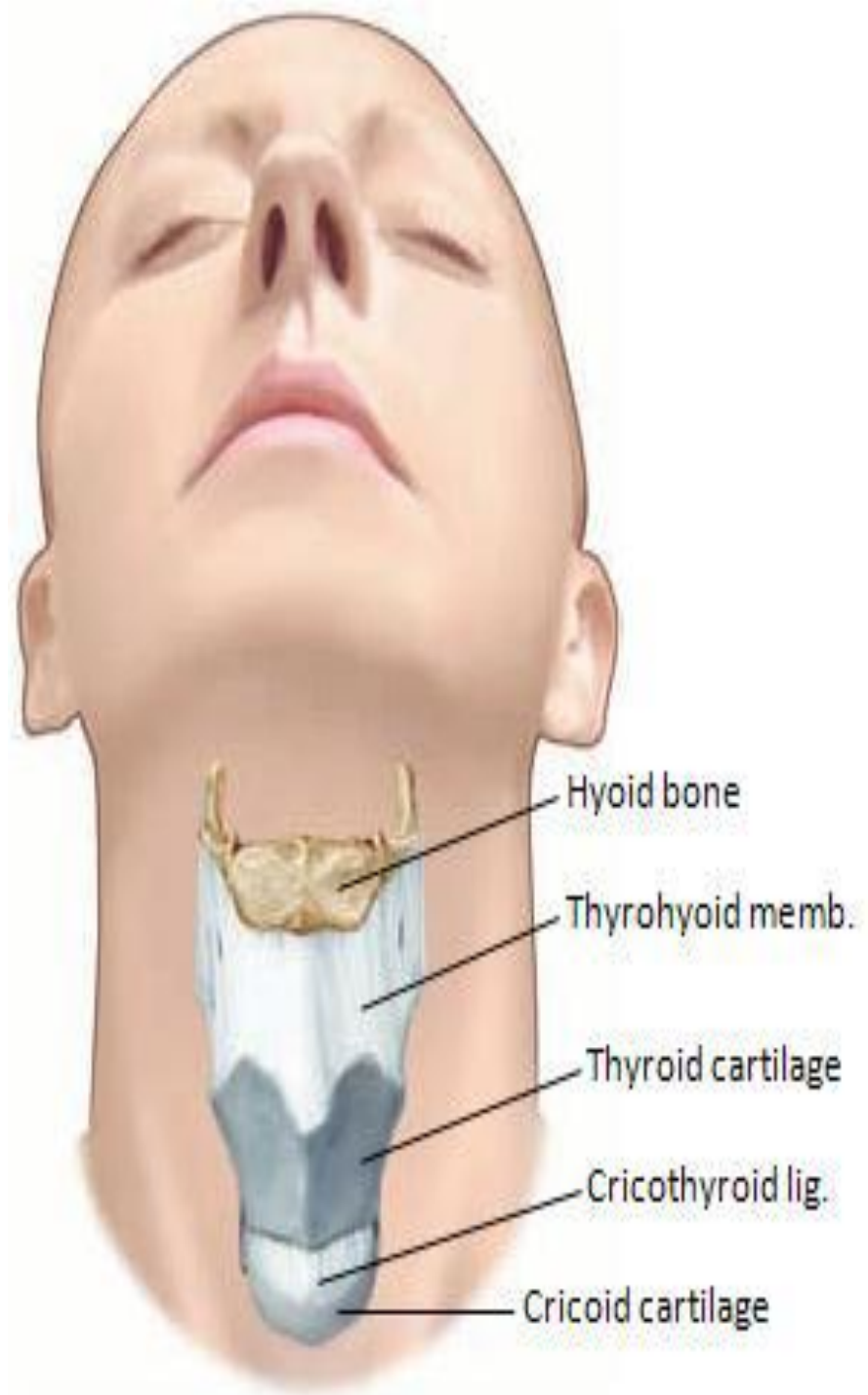
- **Definition:** part of respiratory tract that acts as ^(*)organ of phonation (*voice production*) & it has a ^(*)sphincteric function to prevent passage of food and foreign bodies through its inlet.

- **Extent:** from the root of tongue to trachea. It lies in front of ^(cervical)C3-C6 vertebrae

↳ After C6. Beginning of trachea

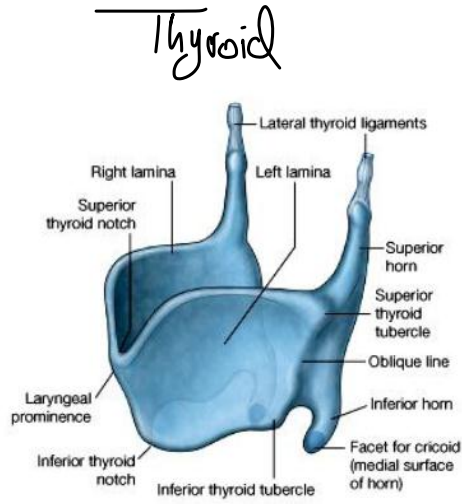


*** Constrictions: Formed of skeletal framework of cartilages connected together by joints, ligaments & membranes. It is lined by mucous membrane.**

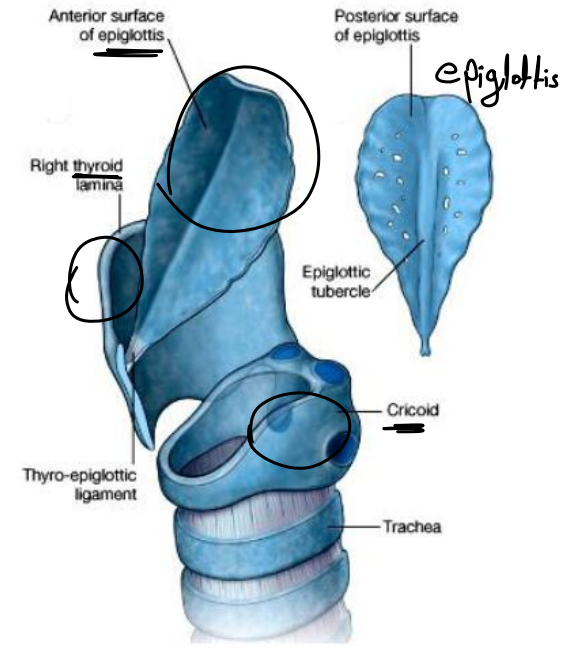


* Cartilages of Larynx:

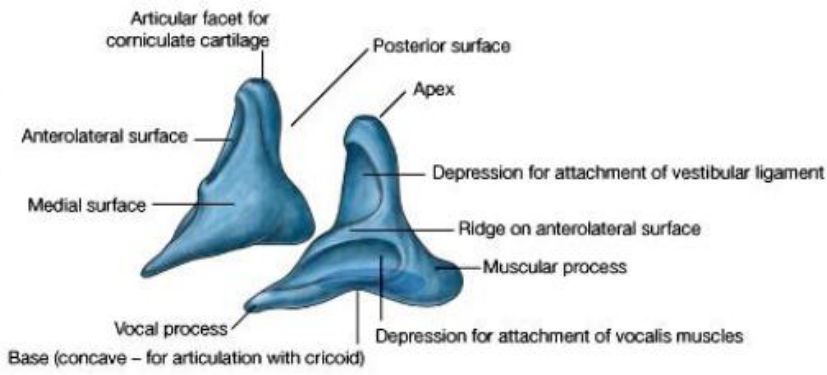
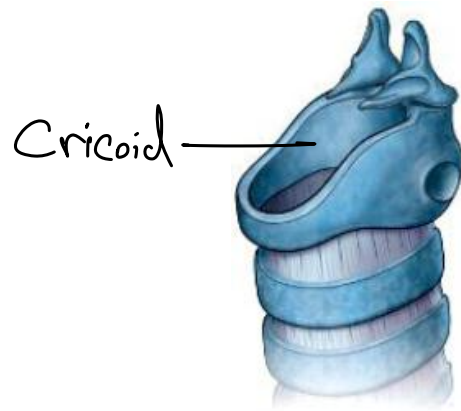
- **Single** : Thyroid, cricoid & epiglottis.
- **Paired**: Arytenoid, corniculate and cuneiform.



a) Thyroid cartilage – anterolateral view



b) Epiglottis – anterolateral view and posterior surface



c) Arytenoid cartilages

Btw the cartilages

Laryngeal ligaments & membranes

ligament = membrane

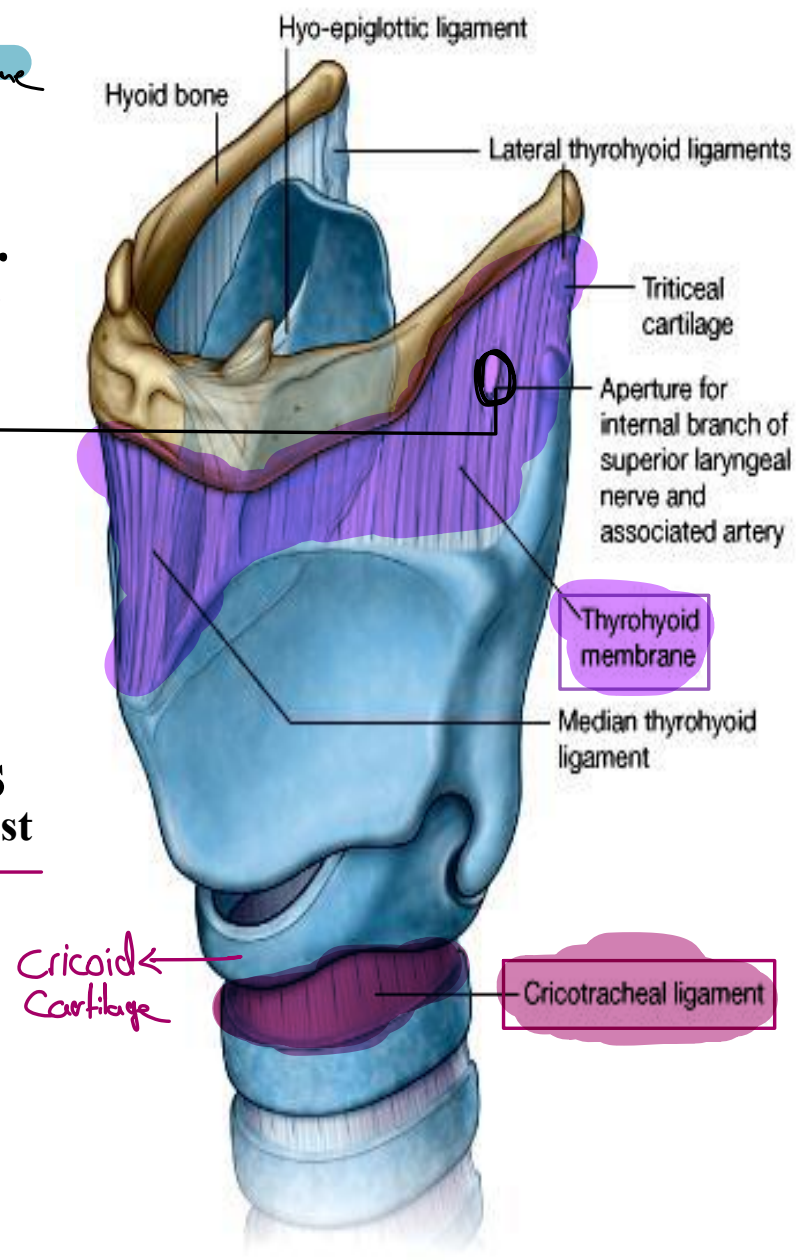
A) Extrinsic ligaments:

1- Thyrohyoid membrane: Extends from lower border of hyoid to upper border of thyroid cartilage.

- It is **pierced** by the internal laryngeal nerve & superior laryngeal artery.

2- Cricotracheal ligament: ^{Or membrane} Connects lower border of cricoid cartilage & 1st tracheal ring.

3- Glosso-epiglottic ligament : connecting tongue to epiglottis.



B) Intrinsic ligaments:

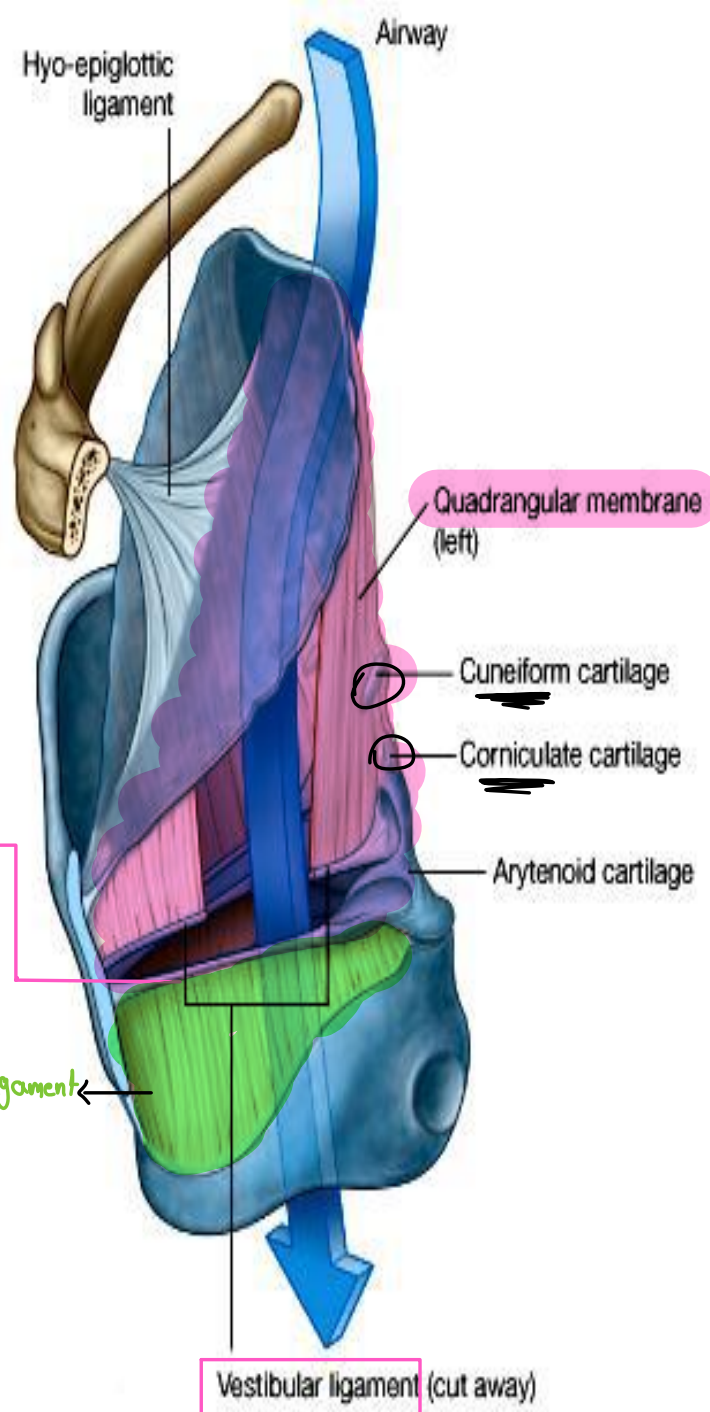
1-Quadrante membrane: a fibro-elastic membrane that lies beneath mucous membrane of vestibule of larynx.

- **Anteriorly:** attached to side of epiglottis.
- **Posteriorly:** attached to arytenoid cartilage.
- Its upper border is free and forms aryepiglottic fold.
- Its lower border is free and forms vestibular ligament.

↳ Another name:- False vocal cords.

2- Cricothyroid ligament: a fibro-elastic membrane that lies beneath mucous membrane of lower part of larynx.

- Its anterior part is thick & connects the adjacent sides of cricoid and thyroid cartilages.
- Its lateral part has an upper free border that forms vocal ligaments.



Laryngeal cavity: → Cavity of the larynx.

- Extends from laryngeal inlet to the trachea.
- It is partially divided into three areas by two folds of mucosa.
- The upper folds: vestibular folds and the lower folds: the vocal folds.

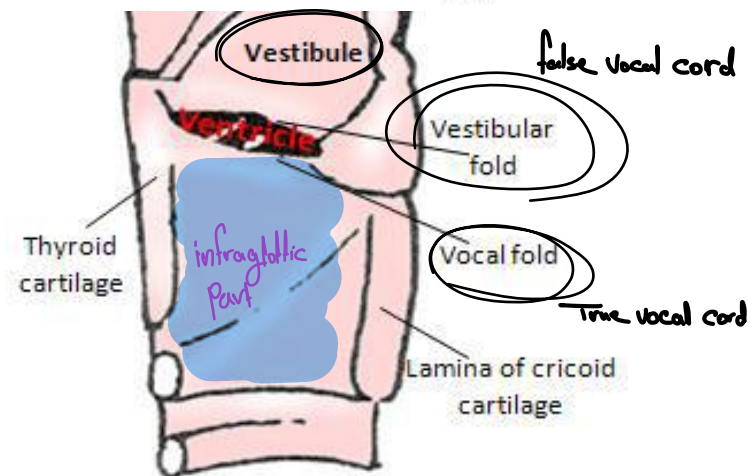
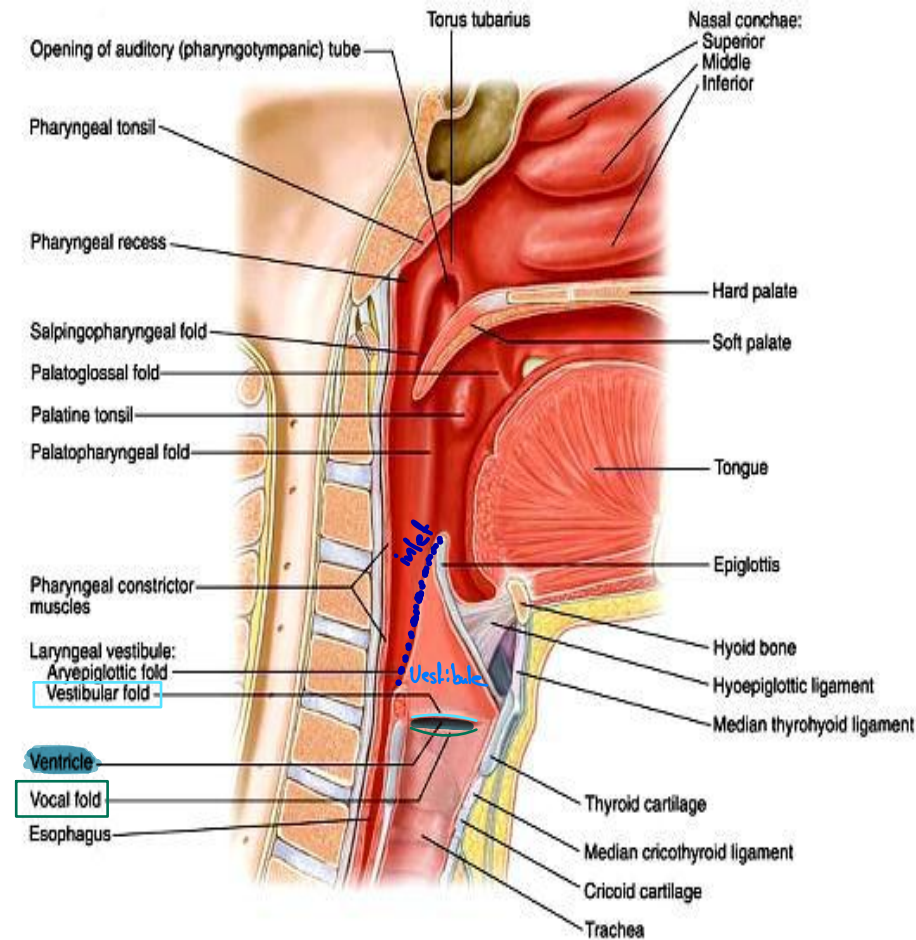
له اىك، اىواصل بيون
Epiglottis & Arytenoid

1- The *vestibule* lies between inlet and vestibular folds.

2- The *laryngeal ventricle (sinus)* is the depression between the vestibular folds above and the vocal folds below.

3- *infraglottic part of the larynx:*

The area below the vocal folds

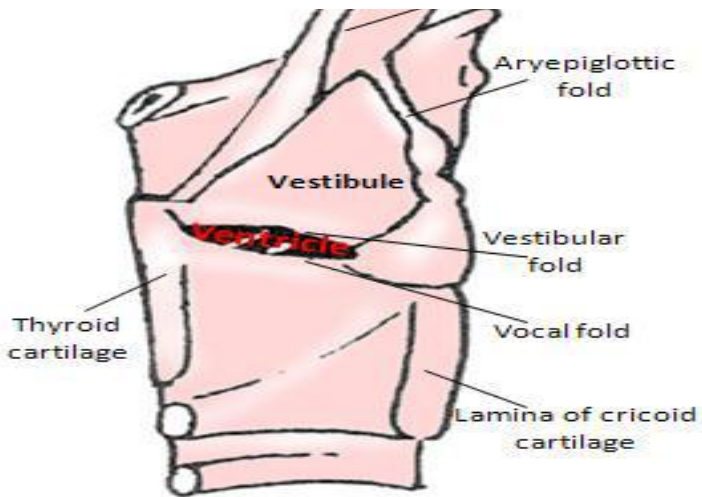
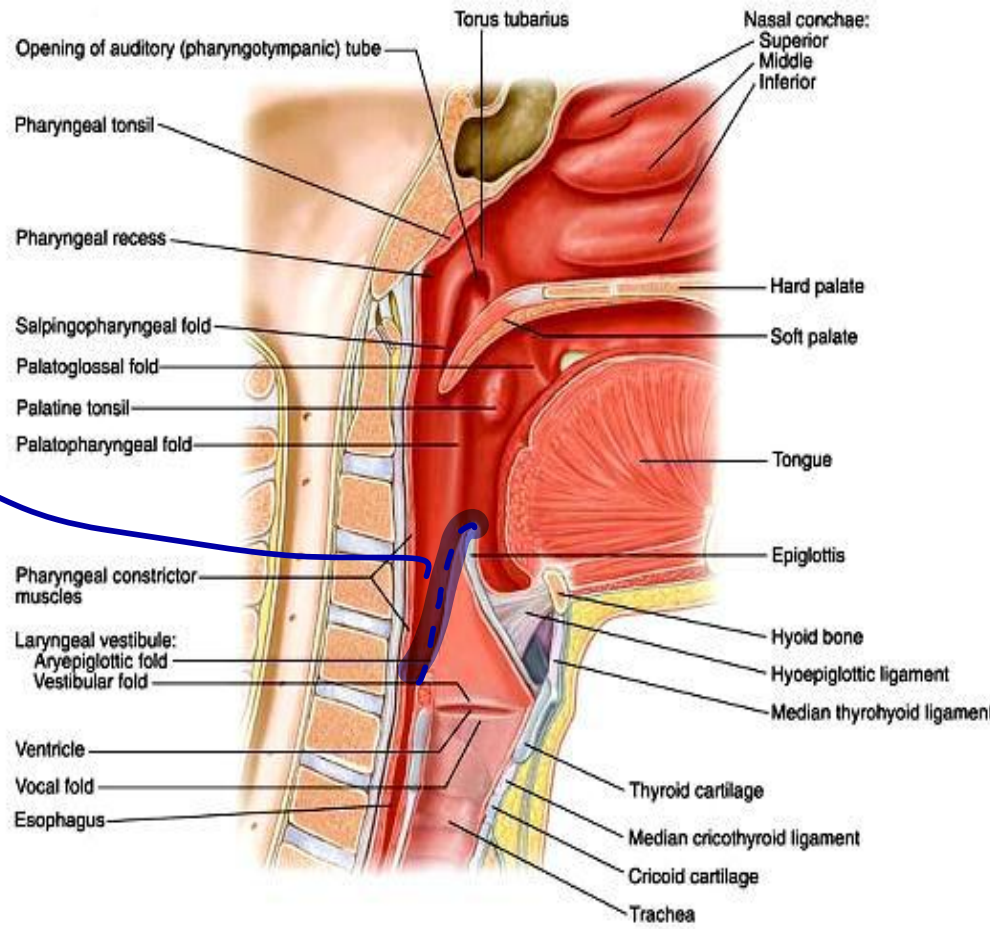


• * **Boundaries of Laryngeal Inlet:**

-Anteriorly: Epiglottis (upper end).

-Laterally: Aryepiglottic folds. *Btw Epiglottis & Arytenoid ↙ ↘*

-Posteriorly: Mucosa covering the arytenoid cartilages.



↳ Responsible for the movement of vocal fold.



Laryngeal muscles

- **-The extrinsic muscles:** ↪ from outside the larynx, But it helps it.

Include: **infra-hyoid muscles**, the **inferior constrictor**, **stylopharyngeus m** and **palatopharyngeus m**.

→ in laryngeal cavity

- **-The intrinsic muscles:**

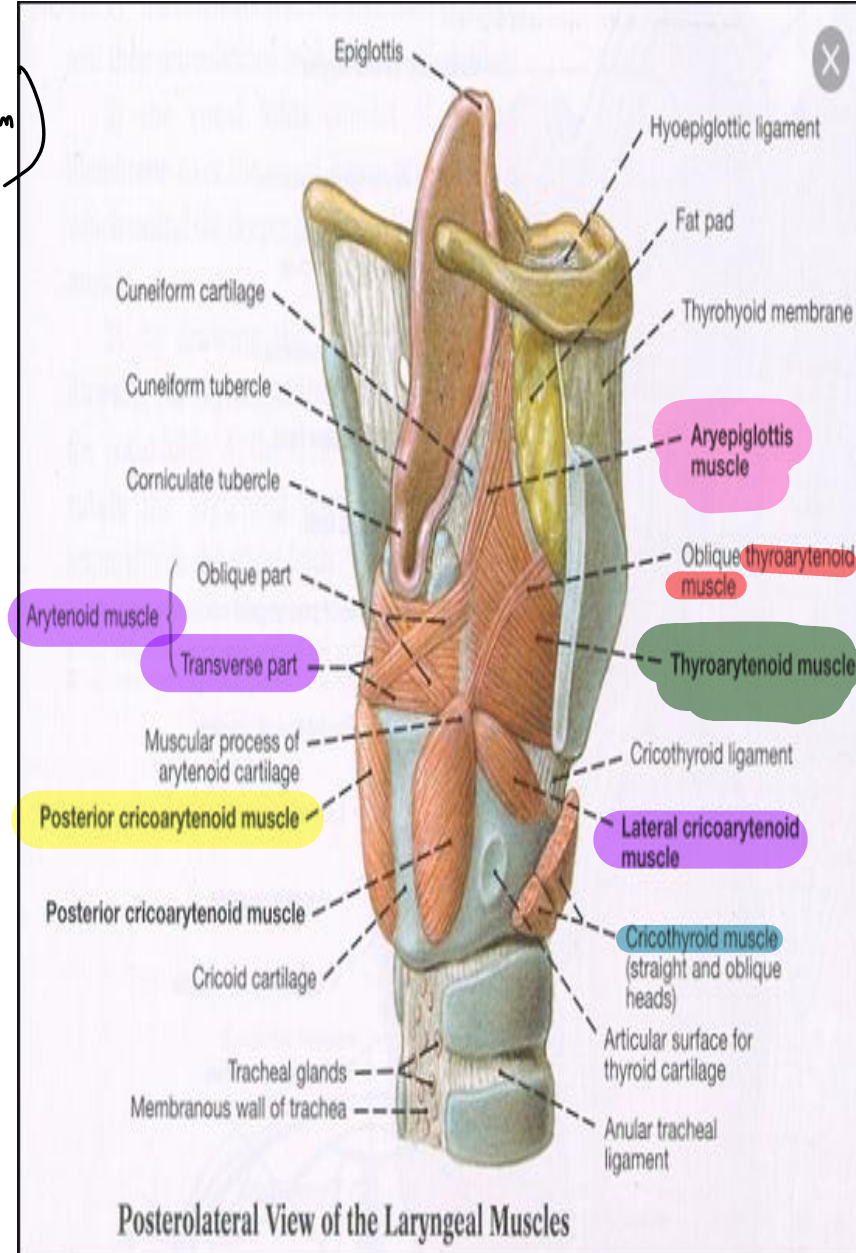
(Just in larynx)

- **⊛ They have no extra laryngeal attachment (connecting different cartilages together, so most of them are paired except transverse arytenoid muscle).**
- **⊛ All of them lies from inside except cricothyroid m that lies externally** → لكن نعتبرها intrinsic
- **- All of them are developed from 6th pharyngeal arch except cricothyroid m which is developed from 4th arch.**

Action of laryngeal muscles

حفظ يا اخوان

| Muscle | Action (To prevent food from entering.) |
|--|---|
| 1-Aryepiglottic m from epiglottis to Arytenoid. | <u>Close laryngeal inlet</u> |
| 2-Thyroarytenoid m | <u>Open laryngeal inlet</u> |
| 3-Cricothyroid m | Stretch vocal fold "tense" Contraction |
| 4-Thyroarytenoid m | <u>Relax vocal fold</u> |
| 5-posterior cricoarytenoid m | <u>Abduct vocal folds</u> |
| 6-Lateral cricoarytenoid m | <u>Adduction of vocal folds</u> |
| 7-Transverse arytenoid m | |



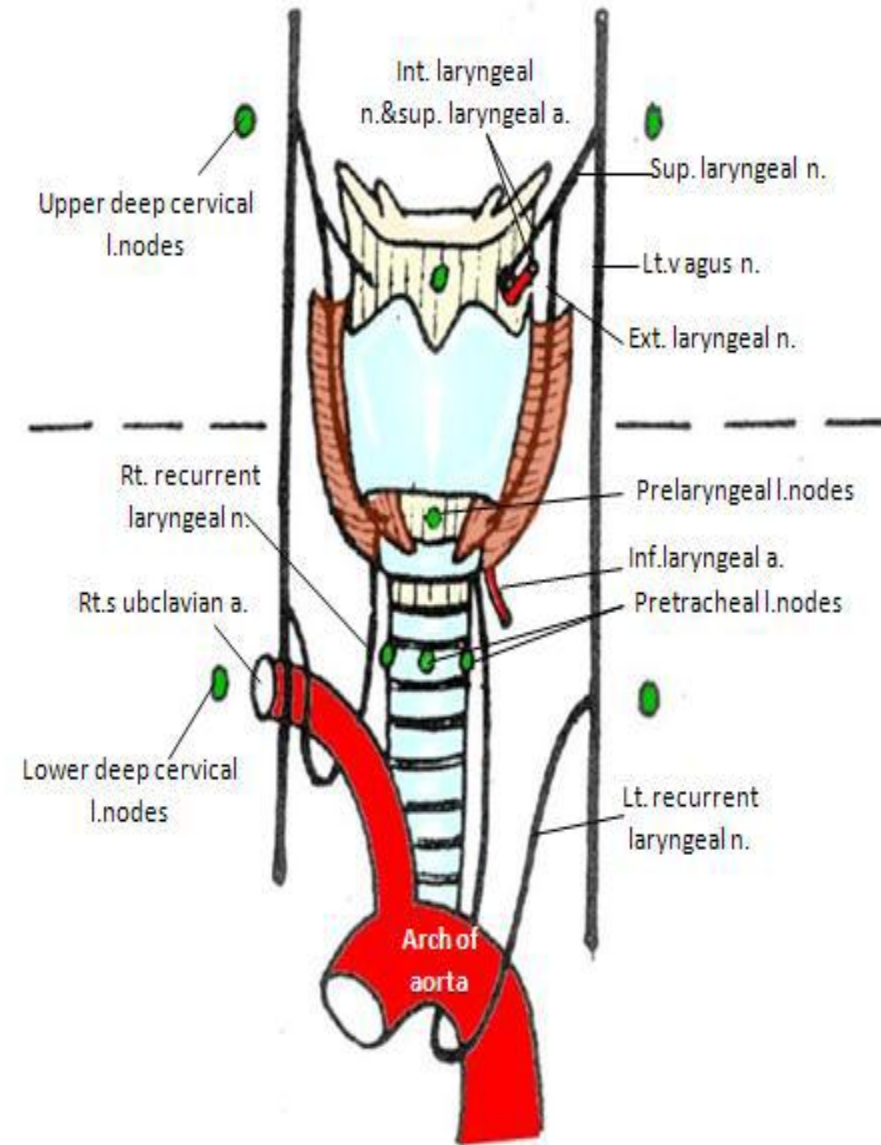
Nerve supply

1- **Motor supply:** all intrinsic laryngeal ms. are supplied by recurrent laryngeal n. branch of vagus n except cricothyroid m which is supplied by external laryngeal n. a branch of superior laryngeal nerve of vagus n. — [⊕] *This is Due to Different locations of development.*

2- **Sensory supply:** the mucosa above vocal cords is supplied by internal laryngeal nerve while the mucosa below vocal cords is supplied by recurrent laryngeal nerve.

Blood supply of the larynx

- **1- Above vocal cords:** supplied by superior laryngeal vessels (branch of superior thyroid a.).
- **2- Below the cords:** supplied by inferior laryngeal vessels (branch of inferior thyroid a.).



Histology of larynx

قاعدتنا الحلوة يلي اتفقنا عليها
ببداية المحاضرة تمام؟♥

- **1. Epithelium:** Pseudo-stratified ciliated columnar with goblet cells.

Except: (V.I)

✓ 1- **The vocal cords.** (true vocal cord)

✓ 2- **anterior Surface of epiglottis**

✓ 3- **the upper part of posterior surface of epiglottis**

are lined by stratified squamous non-keratinized epithelium.

↳ Below The epithelium.

2. lamina propria:

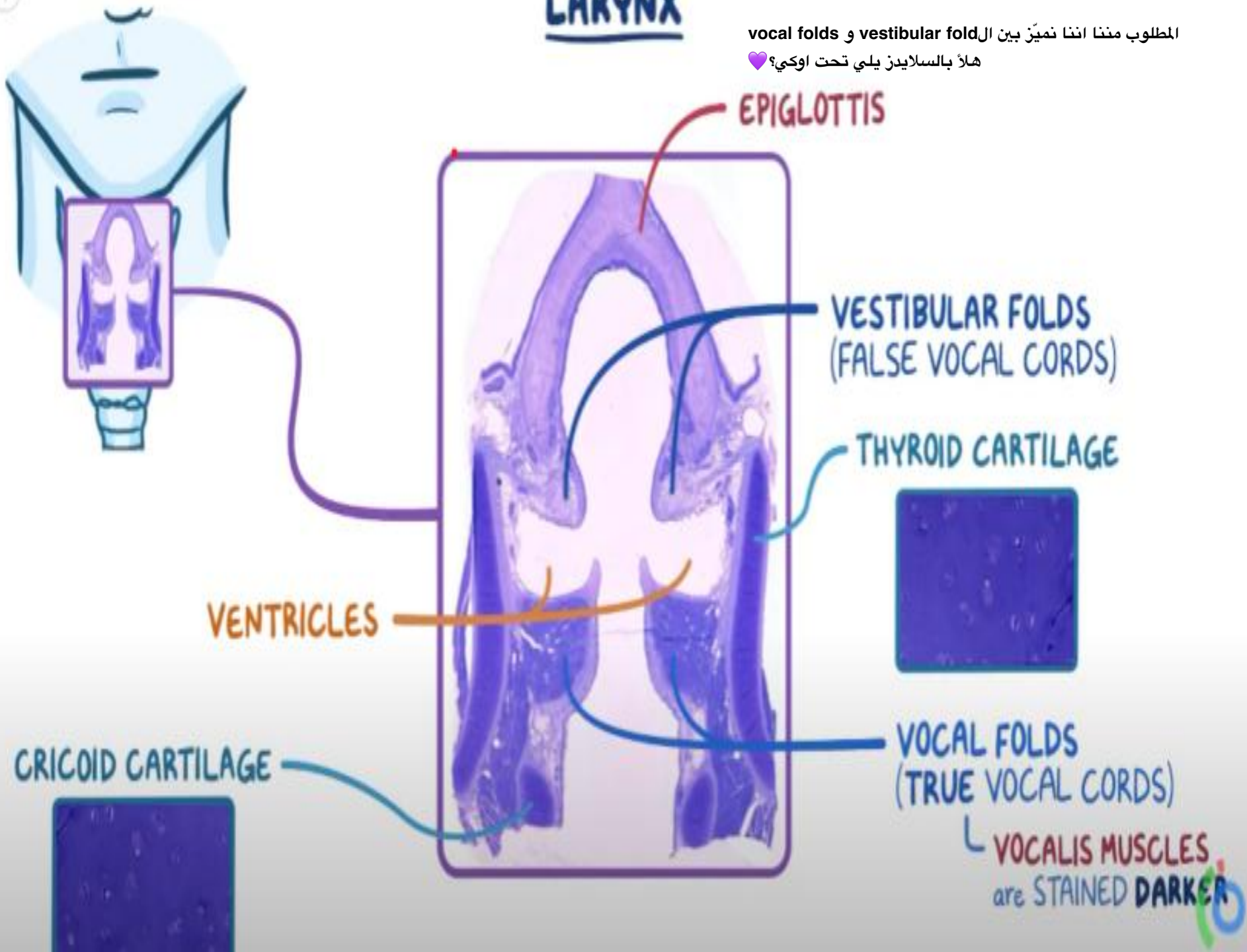
It contains mucus and serous glands.

It contains a number of large and small cartilages which are interconnected by ligaments and voluntary muscles

LARYNX

المطلوب مننا اننا نميِّز بين الـ **vocal folds** و **vestibular fold**

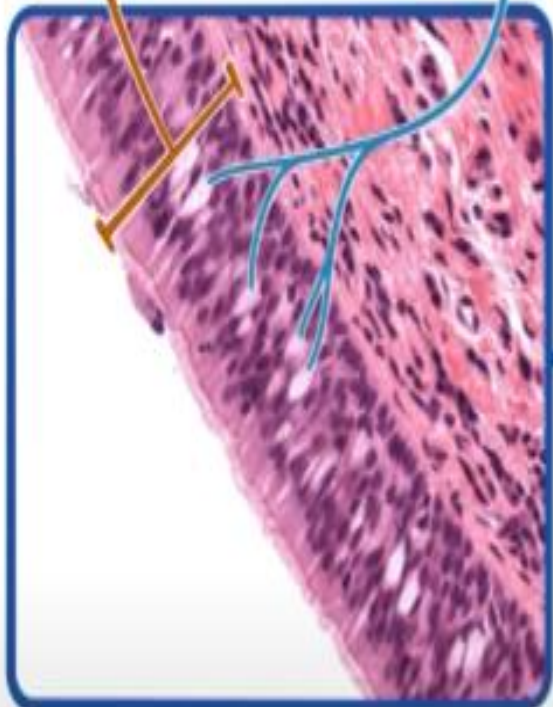
هلاً بالسلايدز يلي تحت او كي؟



UPPER VESTIBULAR FOLD

PSEUDOSTRATIFIED CILIATED
EPITHELIUM with GOBLET CELLS

Epithelium of vestibular:

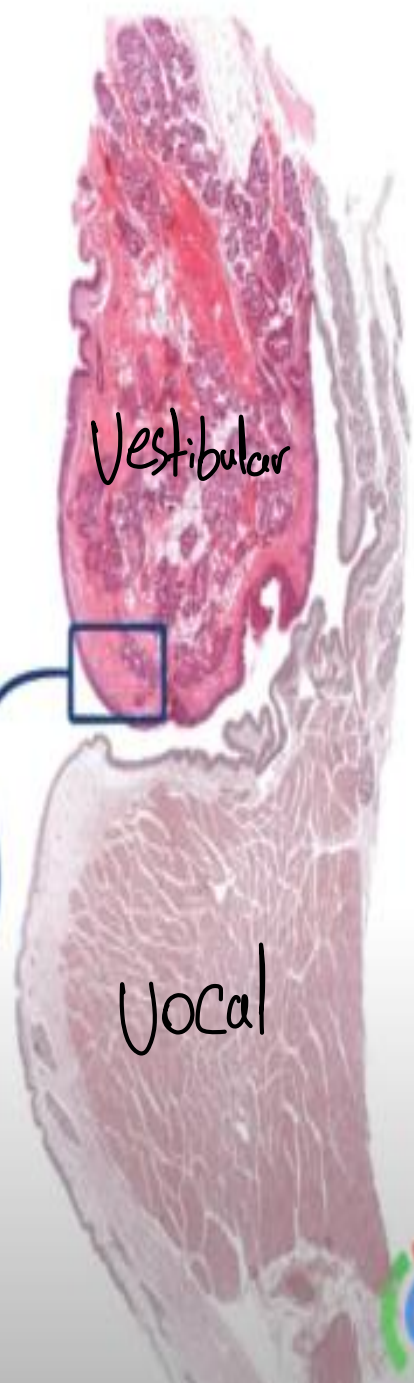
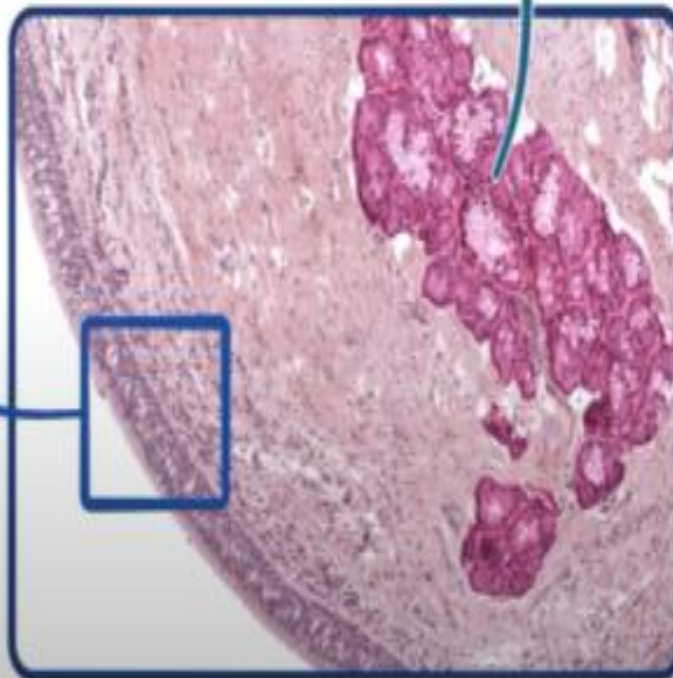


RESPIRATORY EPITHELIUM

may also have PATCHES of
STRATIFIED SQUAMOUS EPITHELIUM

Lamina propria:

SEROMUCOUS GLANDS



Vestibular

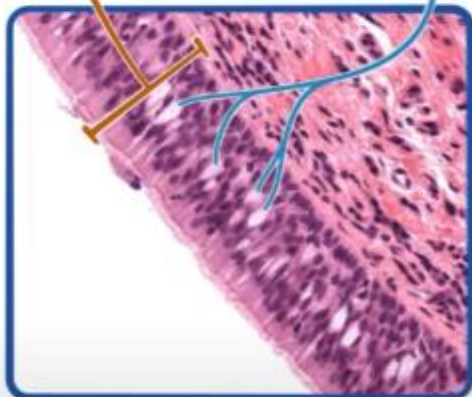
Vocal



i

UPPER VESTIBULAR FOLD

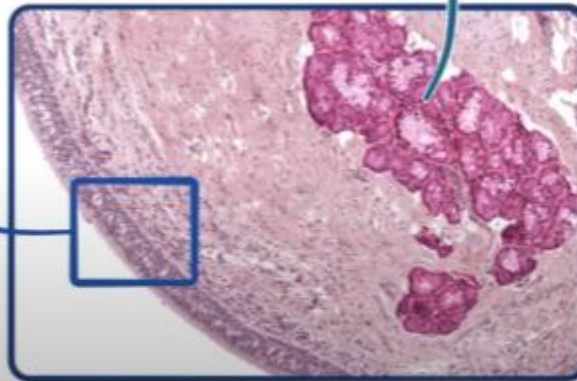
PSEUDOSTRATIFIED CILIATED EPITHELIUM with GOBLET CELLS



RESPIRATORY EPITHELIUM

may also have PATCHES of STRATIFIED SQUAMOUS EPITHELIUM

SEROMUCOUS GLANDS



TRUE VOCAL CORDS

Epithelium of vocal:

LAMINA PROPRIA

RESPIRATORY EPITHELIUM

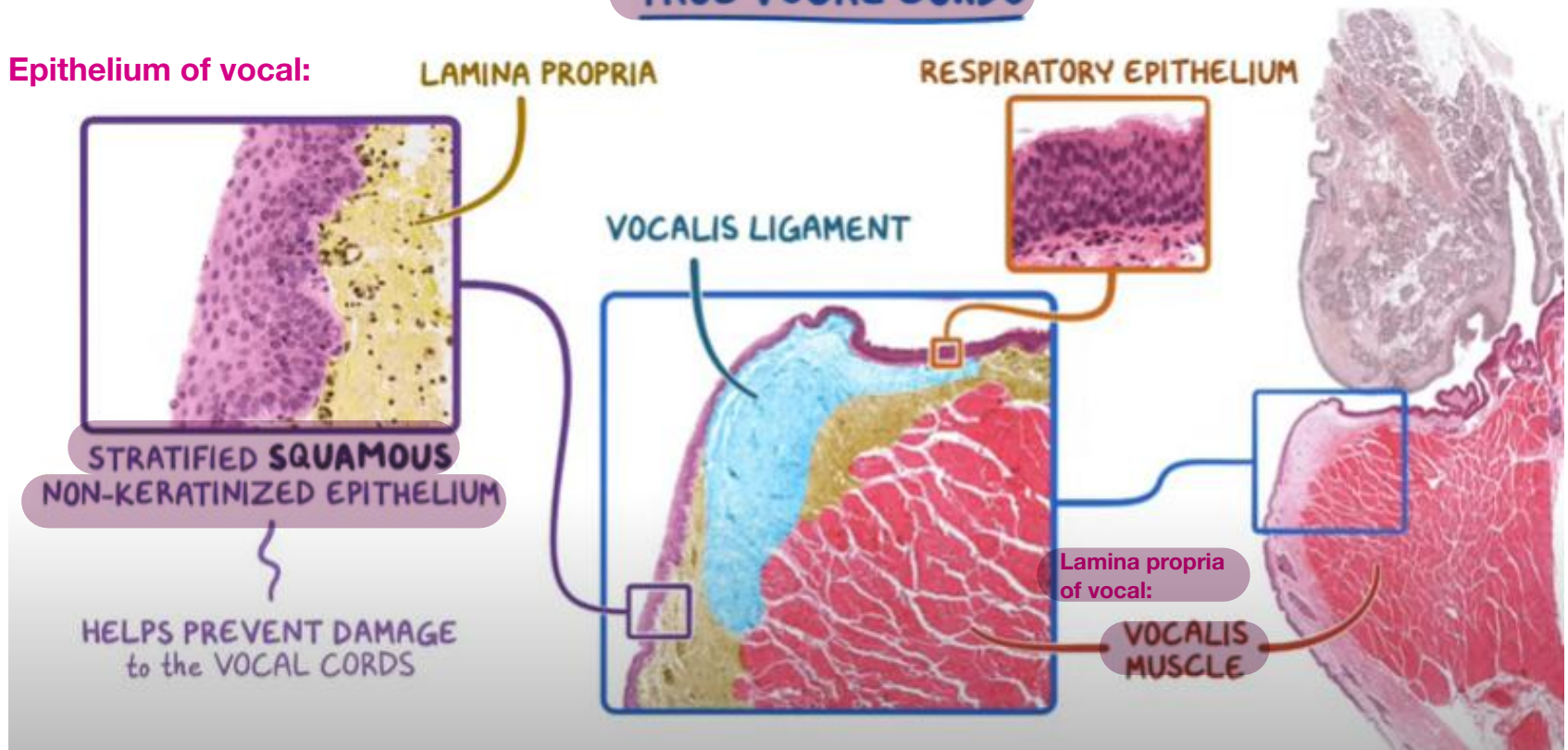
VOCALIS LIGAMENT

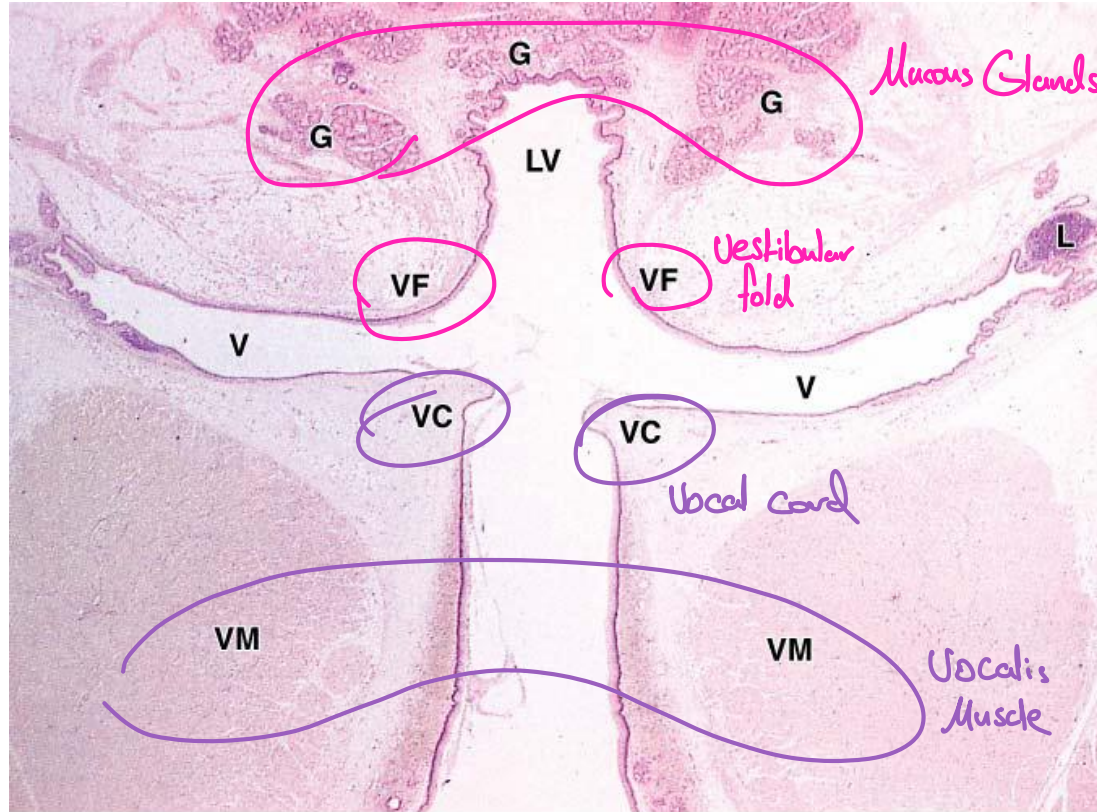
STRATIFIED **SQUAMOUS**
NON-KERATINIZED EPITHELIUM

HELPS PREVENT DAMAGE
to the VOCAL CORDS

Lamina propria
of vocal:

VOCALIS
MUSCLE





Source: Mescher AL: *Junqueira's Basic Histology: Text and Atlas, 12th Edition*: <http://www.accessmedicine.com>
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The low-power micrograph shows the upper laryngeal vestibule (LV), which is surrounded by seromucous glands (G). The lateral walls of this region bulge as a pair of broad folds, the vestibular folds (VF). These contain seromucous glands, often with lymphoid nodules (L) and are largely covered by respiratory epithelium, with regions near the epiglottis having stratified squamous epithelium. Below each large vestibular fold is a narrow space or ventricle (V), below which is another pair of lateral folds, the vocal folds or cords (VC). These are covered by stratified squamous epithelium and project more sharply into the lumen, defining the rim of the opening into the larynx itself. Each contains a large striated vocalis muscle (VM)

خلصنا المحاضرة بس حابة اجمعلكم كم شغلة حسيتهم مهمين وهيكا يكونو بصفحة وحدة
 تراجعو منها بلا ما تتغلبو بين السلايدات

#الاستثناءات يلي ما بيكونو pseudo stratified columnar epithelium with goblet cell:

1-the vestibule of the nose → stratified squamous keratinized epithelium

2-vocal cords

3-anterior surface of epiglottis

4-the upper part of posterior surface of epiglottis

Stratified squamous non keratinized epithelium

| | Vestibular cords (False vocal cords) | Vocal cords (True vocal cord) |
|----------------|--|--|
| Epithelium | Pseudo stratified columnar epithelium with goblet cell | Stratified squamous non keratinized epithelium |
| Lamina propria | Mucous gland | Vocalis muscle |

Hedaya

هدايا



Thank You
Thank You
Thank You!!!!

SH@Y