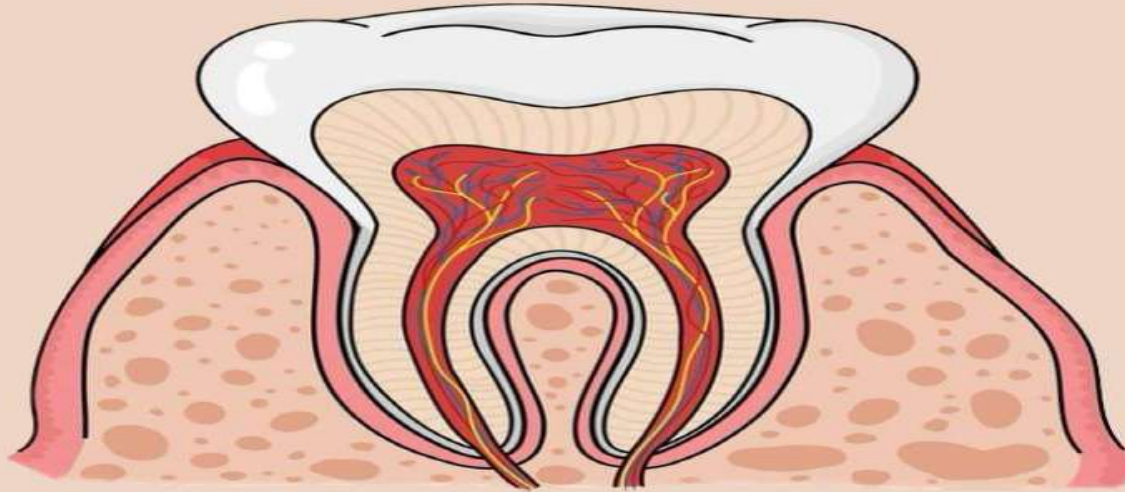




ANATOMY

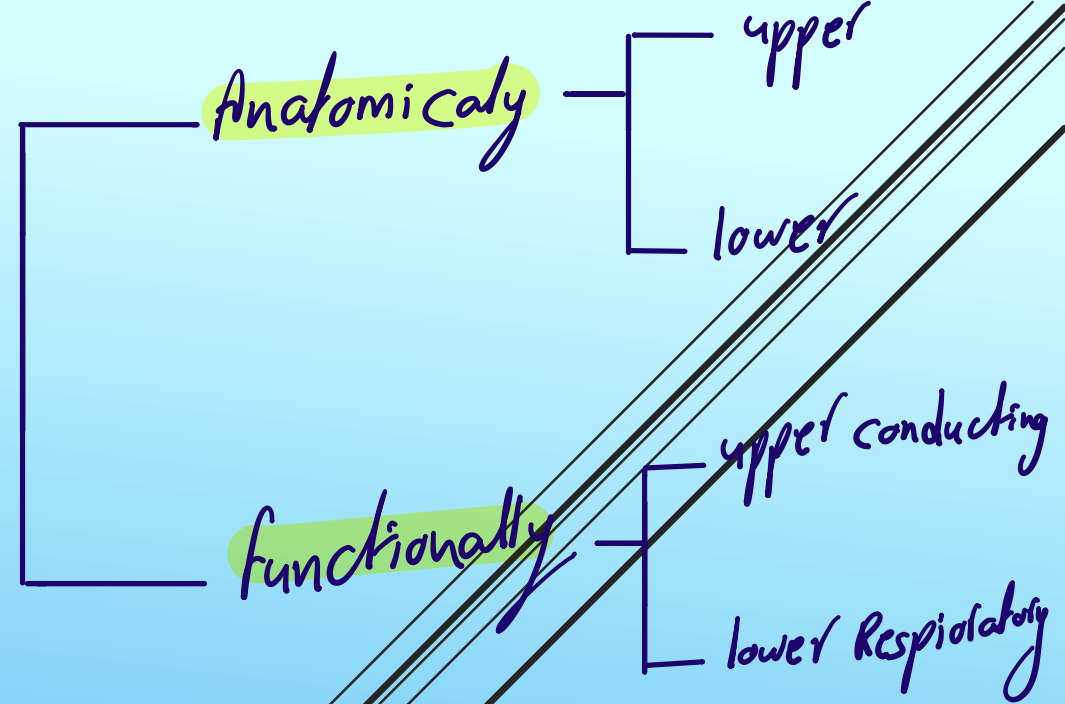


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DONE BY : Nouf Al-amaush.

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

RESPIRATORY SYSTEM

الجهاز التنفسي



By Dr Ahmed Amer

RESPIRATORY SYSTEM

Definition: The respiratory system is concerned with breathing, which is the process of inhalation and exhalation of air during respiration.

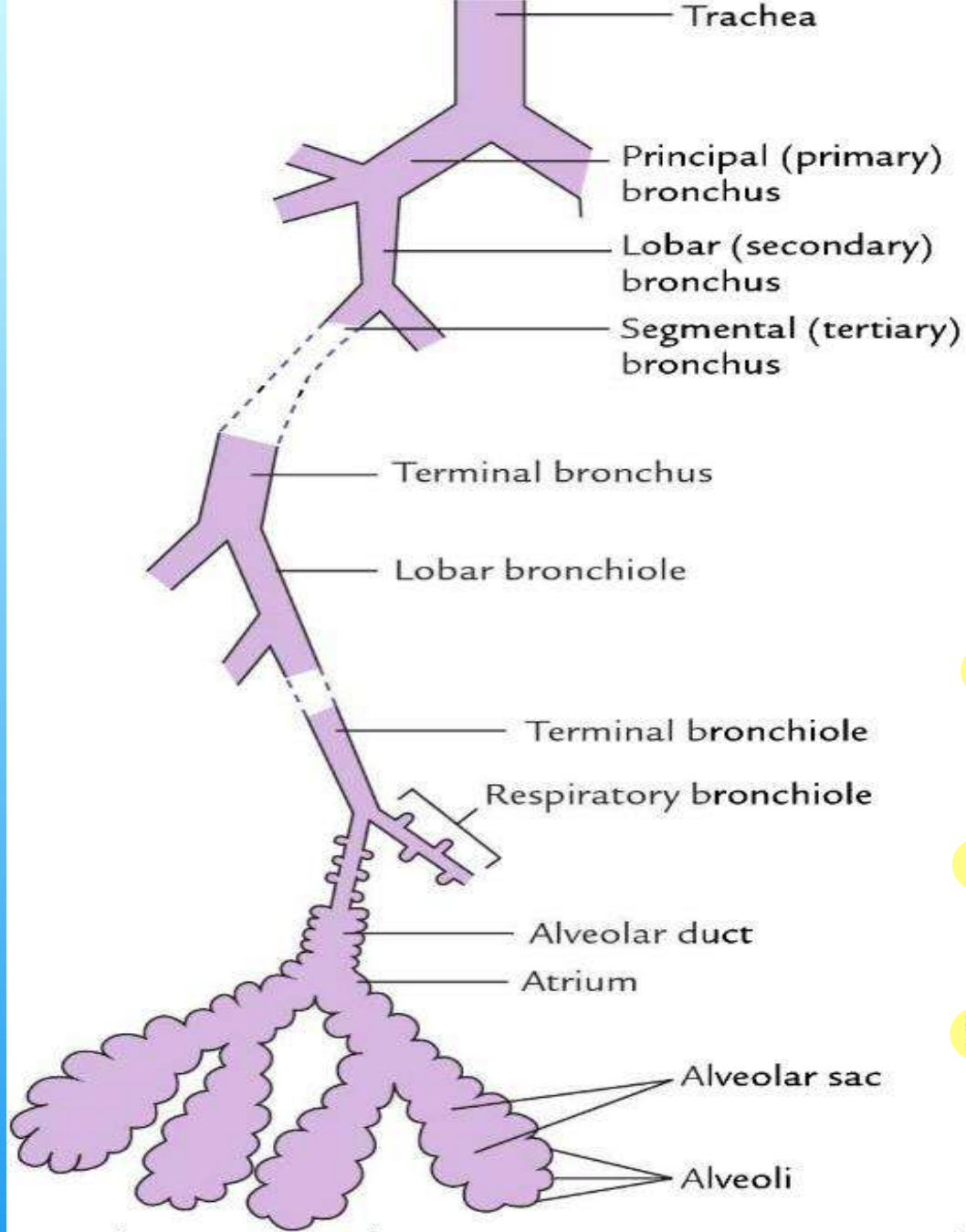
التنفس

الشهيق

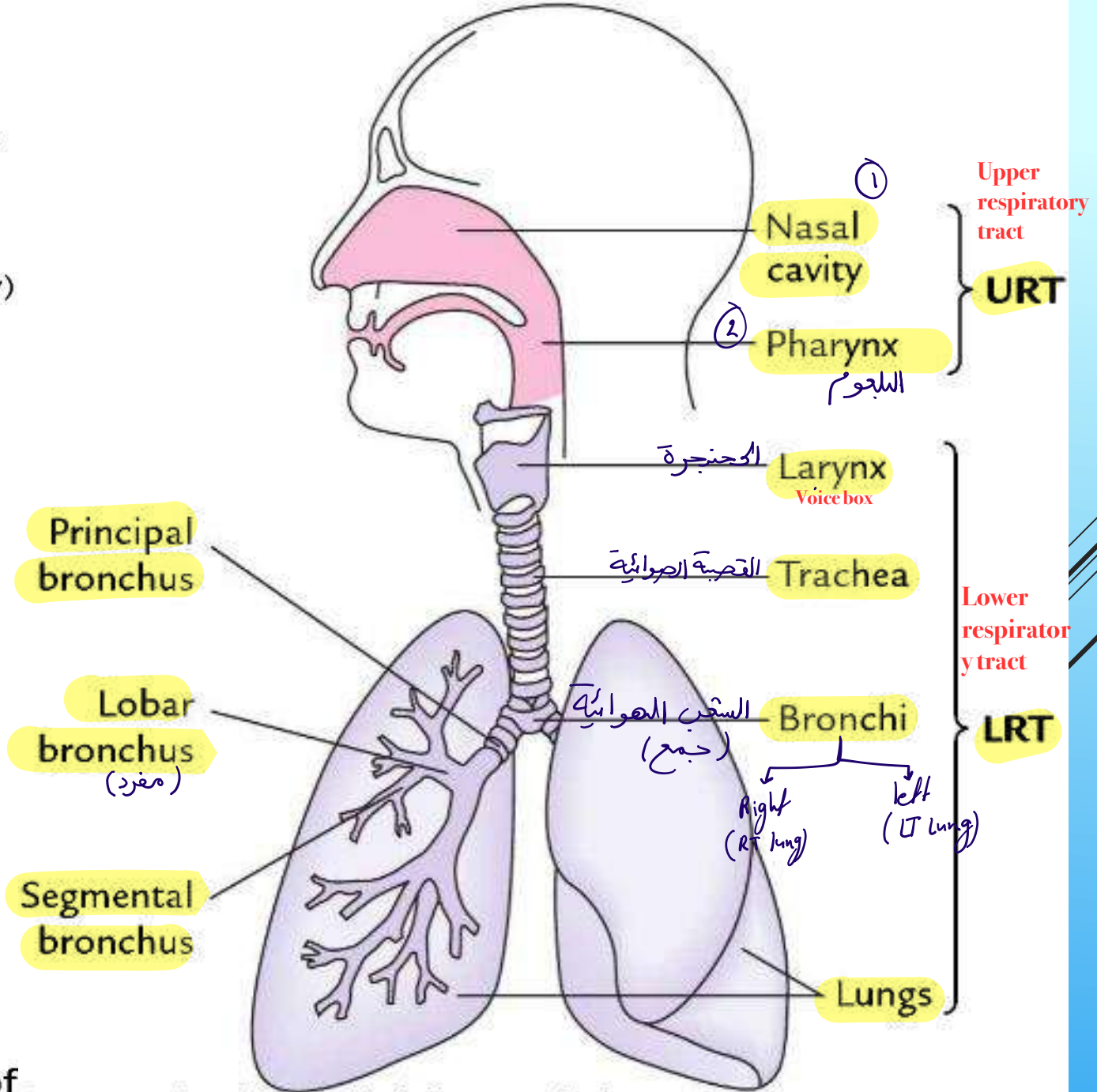
الزفير

Components of Respiratory System

المكونات



Conducting and respiratory portions of trachea and lungs.



Anatomical subdivisions of the respiratory system.

RESPIRATORY SYSTEM

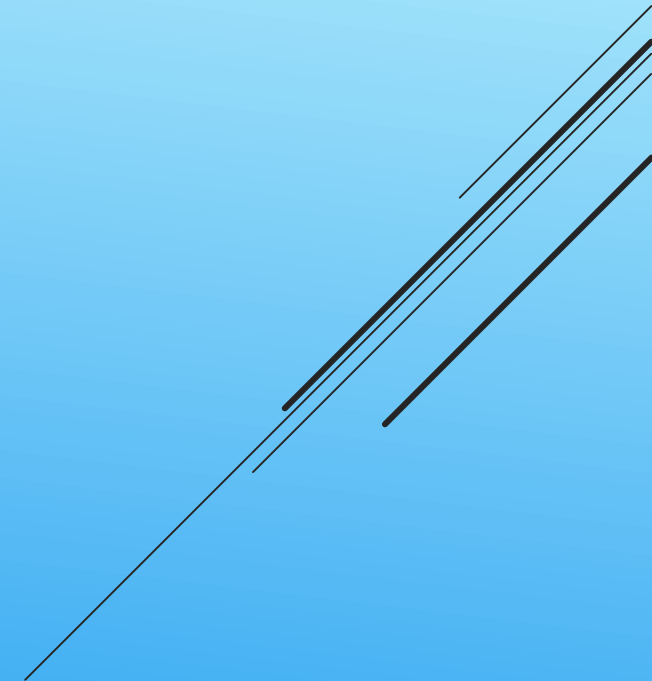
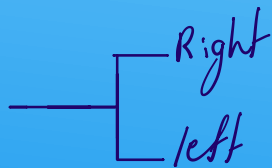
□ **Anatomically**, respiratory system is broadly divided into the following two parts:

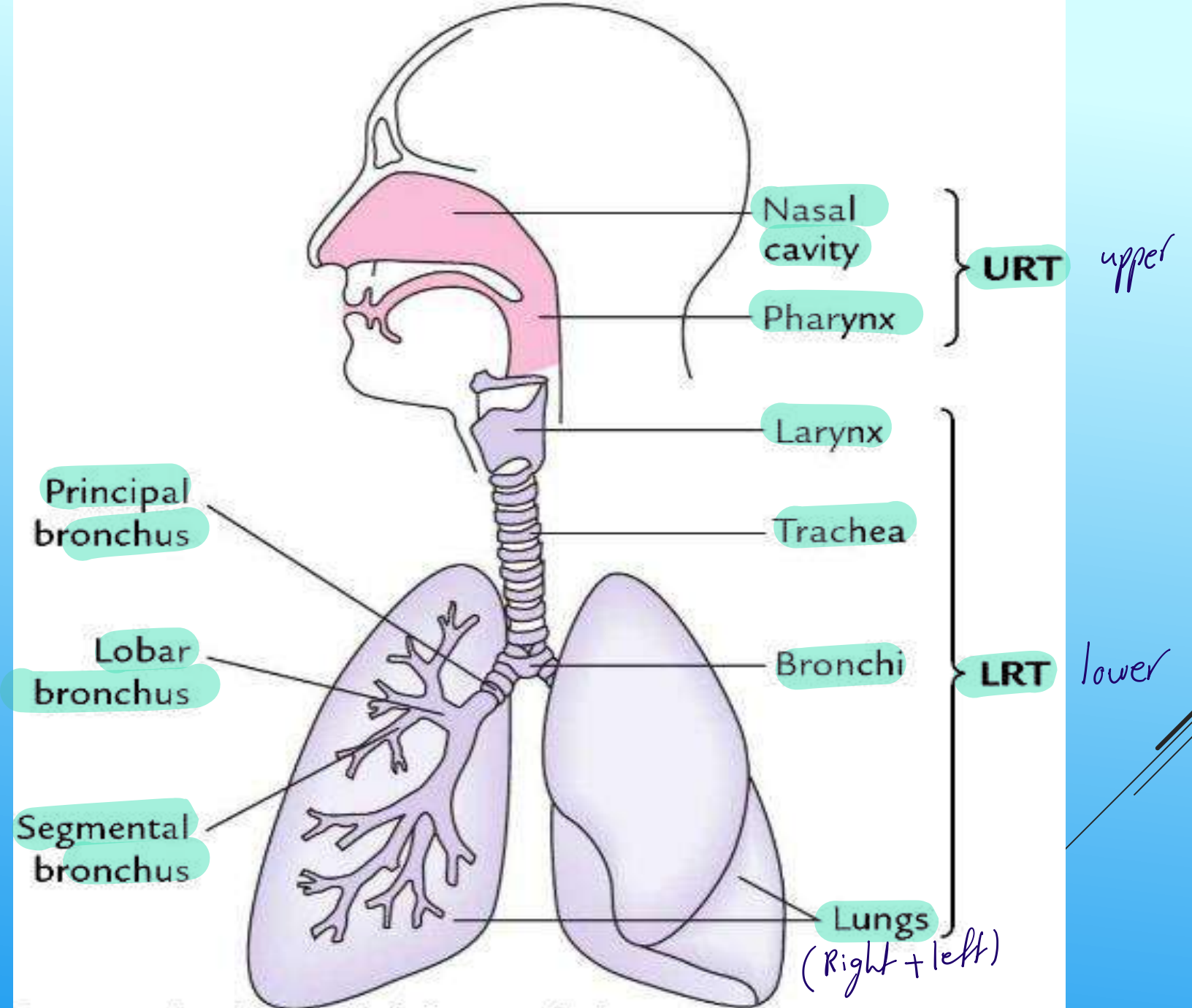
1. Upper respiratory tract (URT): It comprises:

- a) **Nasal cavities**
- b) **Pharynx and associated structures**

2. Lower respiratory tract (LRT): It comprises:

- a) **Larynx**
- b) **Trachea**
- c) **Bronchi**
- d) **Lungs**





Anatomical subdivisions of the respiratory system.

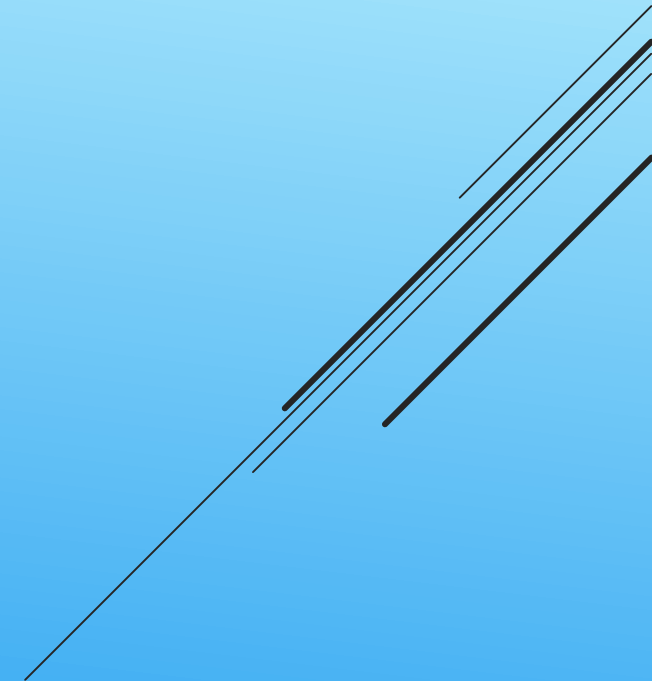
RESPIRATORY SYSTEM

□ **Functionally**, however, the respiratory system is divided into the following two portions:

1. **Upper conducting portion** يوصل الهواء للمكان يلي تتم فيه عملية التنفس
2. **Lower respiratory portion** هون بتصير عملية التنفس شخصياً عن طريق الalveoli
Taking in O₂ and releasing of CO₂

□ **The conducting portion of respiratory system comprises:**

1. **Nasal cavities**
2. **Pharynx**
3. **Larynx**
4. **Trachea**
5. **Bronchi** → تنقسم إلى Bronchioles
6. **Bronchioles**
7. **Terminal bronchioles**



RESPIRATORY SYSTEM

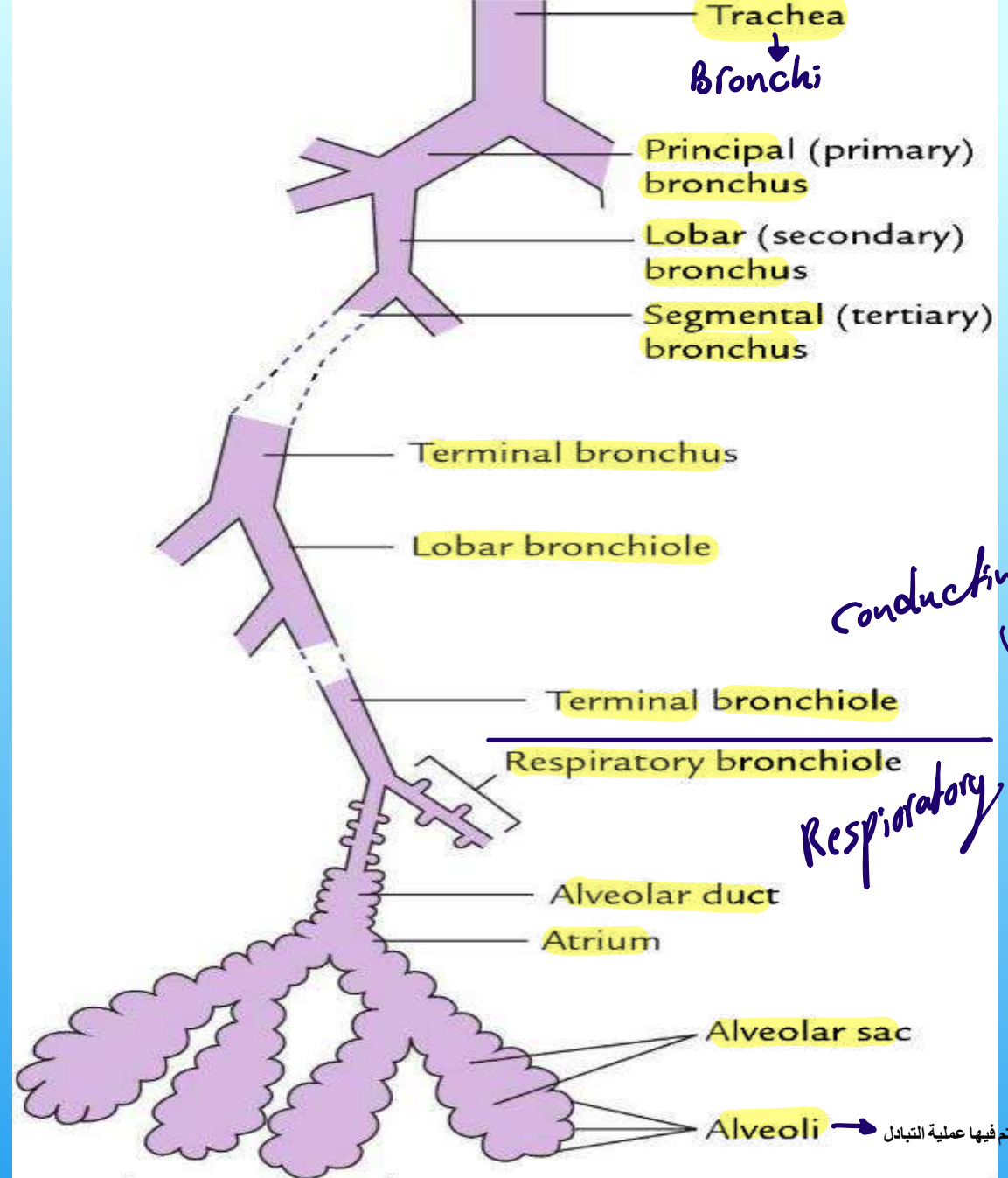
□ The respiratory portion of respiratory system comprises:

1. Respiratory bronchioles

2. Alveolar ducts

3. Alveolar sacs

4. Alveoli حويصلات صغيرة جداً بتمدد ، الغشاء تاعها يسمح بالتبادل انه يدخل الاكسجين و يطلع co2 لبرا



Conducting and respiratory portions of trachea and lungs.

RESPIRATORY SYSTEM

Function:

□ The main functions of the conducting portions of the respiratory system are as follows:

1. Provide a conduit through which air can travel to and from the lungs.

شيء يشبه الممر عشان يمر الهواء من خلاله

عن طريق بخار الماء و

الnasal cavity

يكون رطب يعني معه شوية بخار ماء

2. Condition the inspired air, i.e. filters, warms and moistens the air while it is passing through it.

لانه ببساطة اذا انا اخذت الهواء و هو بارد مثلاً في اوقات الشتاء و هيك ممكن لو دخل بسرعه هاي رح

يأذي الalveoli و برضو بعمل التهاب رئوي

عشان احل هادي المشكلة ... بصيرله تكييف بدل ما هو بارد بنسخنه لدرجة حرارة الجسم

3. Vocalization وظيفة الكلام عن طريق larynx

□ The main function of respiratory portion of respiratory system is:

$O_2 + CO_2$

exchange of gases (oxygen and carbon dioxide) between air and blood, i.e. the air is absorbed and carbon dioxide is eliminated.

RESPIRATORY SYSTEM

عنا عظام ب skull موجود فيها sinuses و هما :
sphenoid, ethmoid, maxilla, frontal

Paranasal air sinuses الجيوب الانفية

The paranasal sinuses are the frontal, ethmoidal, sphenoidal and maxillary sinuses, housed within the bones of the same name.

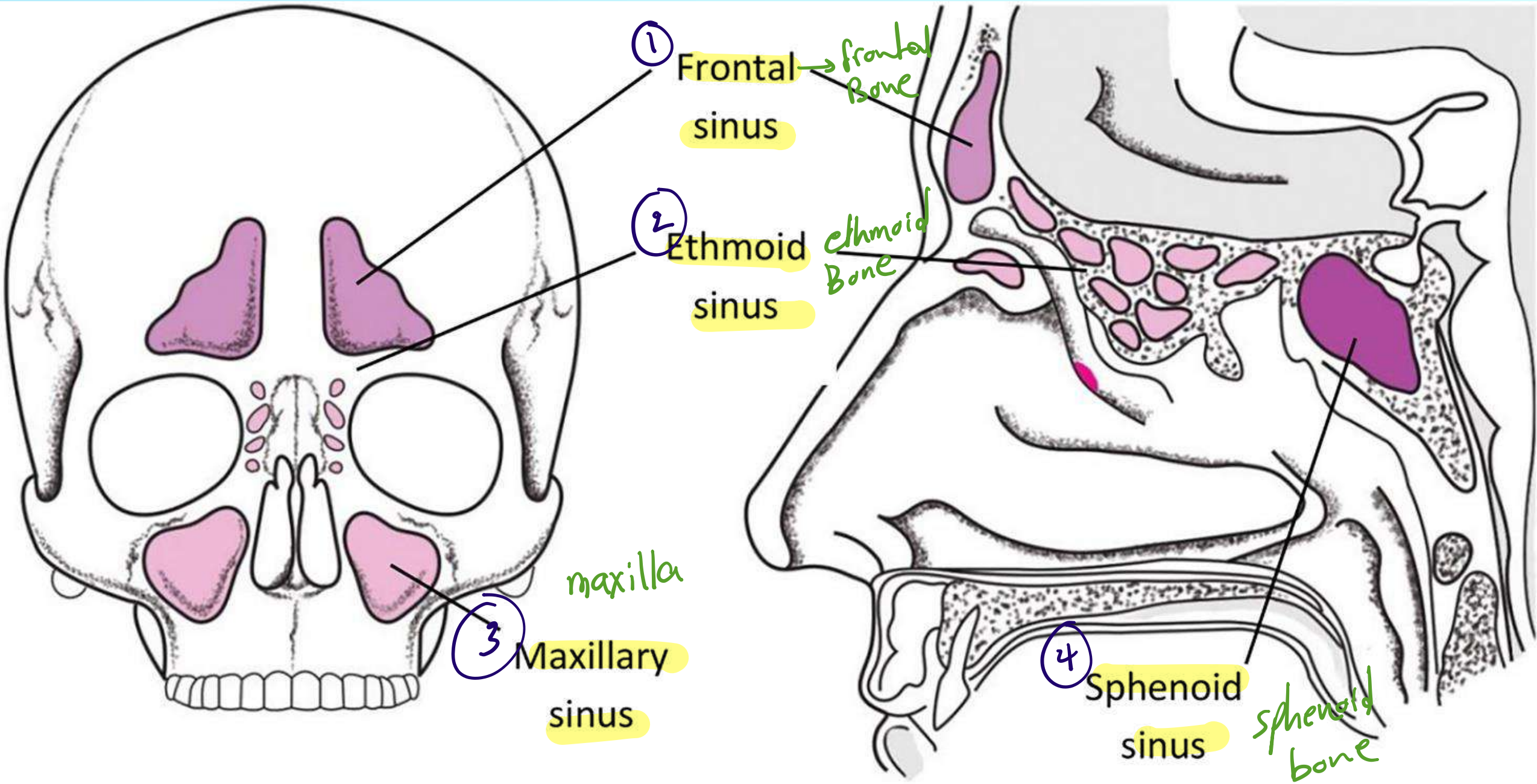
They all open into the lateral wall of the nasal cavity by small apertures.

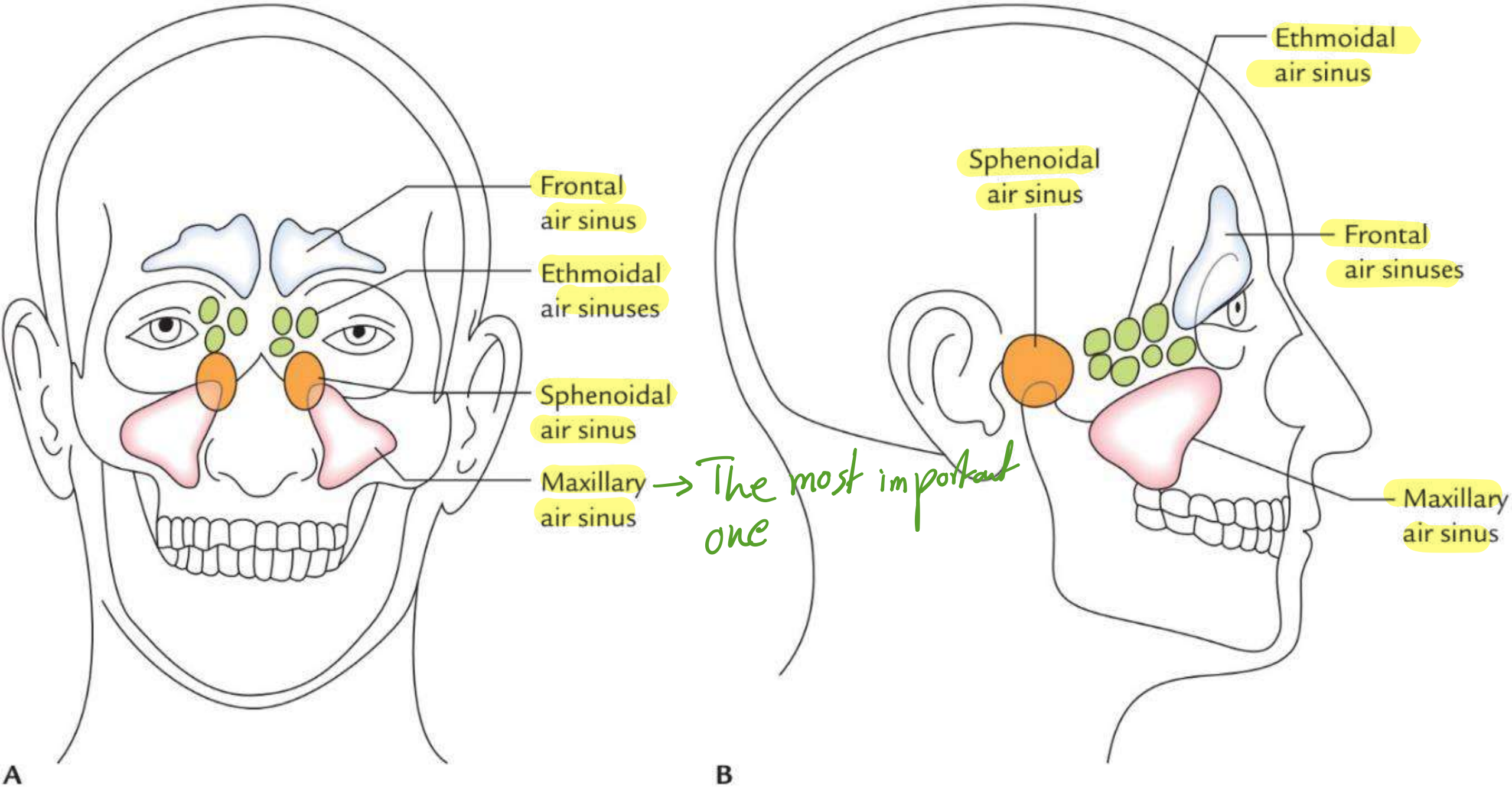
Functions:

زي كأنه بيعمل صدى

1. Add some resonance to the voice
2. Allow the enlargement of local areas of the skull without increase in bony mass. عشان اسمح لل skull تكبر بدون ما ازيد كمية العظام الموجودة
3. Warming of air الهوا لما يدخل للانف ببلش تزيد حرارته عشان يصير زي حرارة الجسم

RESPIRATORY SYSTEM



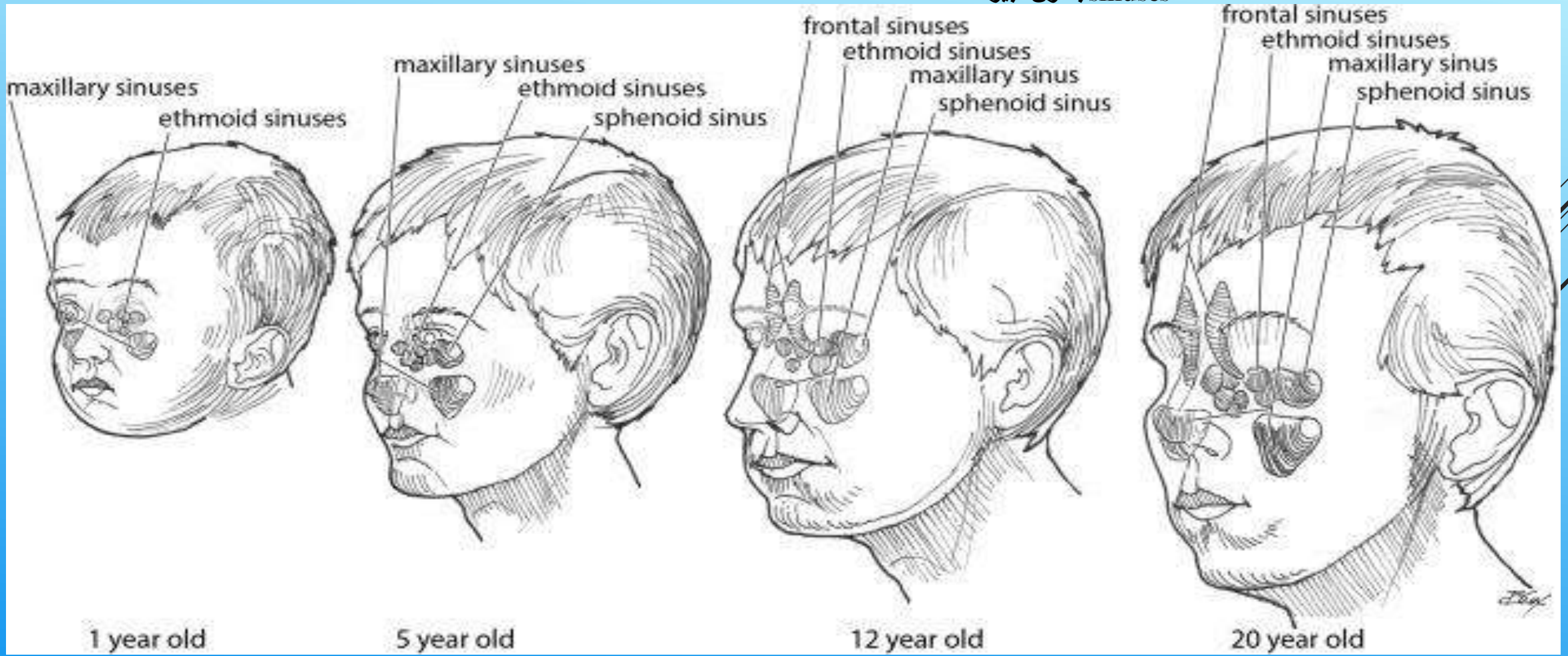


Positions of paranasal air sinuses on the surface: A, front view; B, side view.

Also a function :- **RESPIRATORY SYSTEM**

Most sinuses are rudimentary or absent at birth, but enlarge during the eruption of the permanent teeth and after puberty.

معظم الجيوب بتكون موجوده عند الولادة او بتكون صغيرة جداً مع العمر بتبلش تكبر ف يكون الهم دور في تكوين shape of the face يعني شكلهم بأثر على شكل الbone النهائي ، زي مثلاً لما حدا جبهته عريضة ف الfrontal sinuses بتكون كبيرة



RESPIRATORY SYSTEM

The most important

The maxillary sinus → Related to upper jaw.

The largest of the paranasal sinuses.

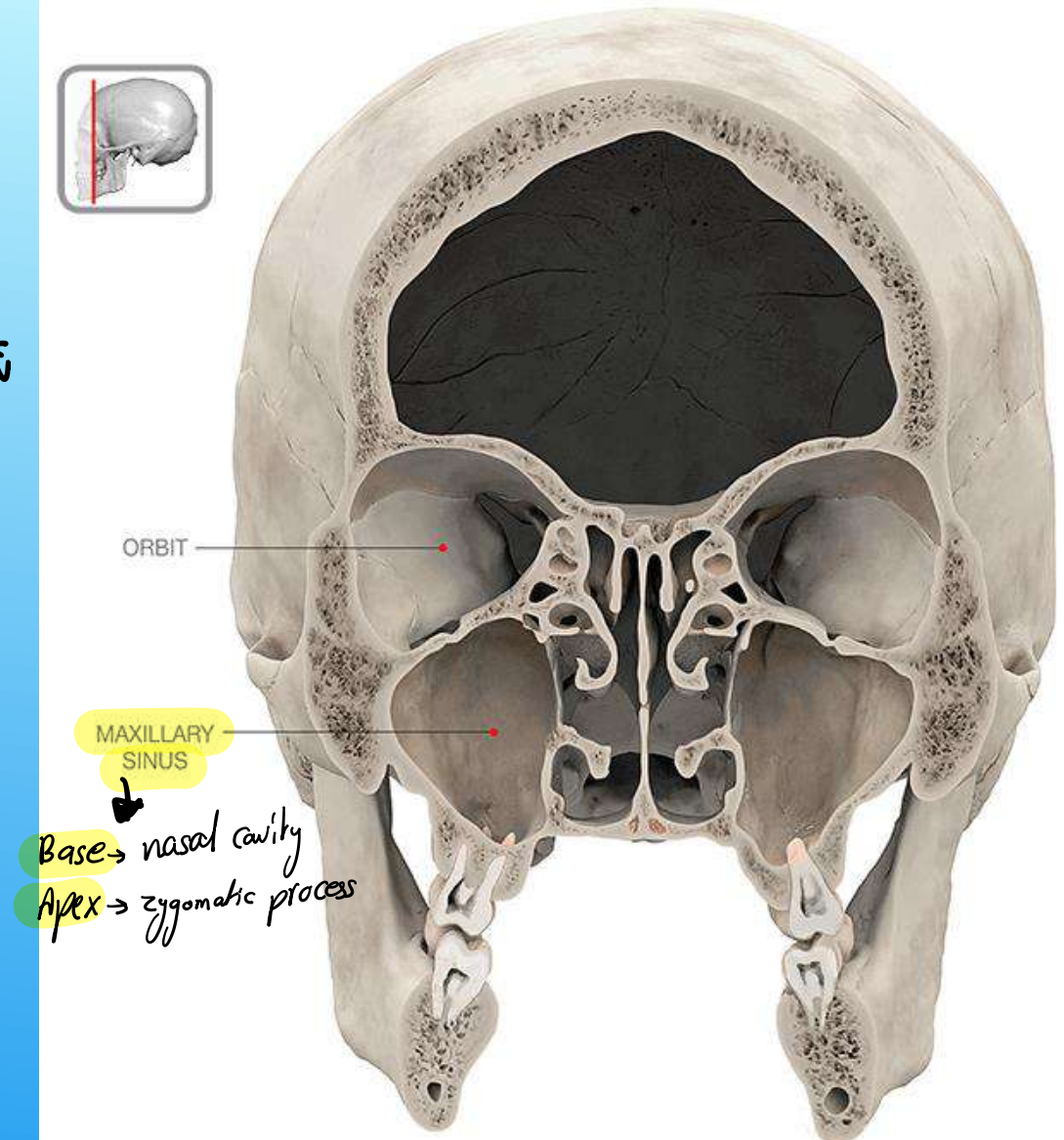
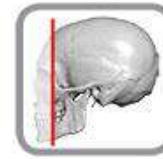
Fills the body of the maxilla and is pyramidal in shape. شكل الهرم

The base is medial and the apex is pointing toward the zygomatic process of maxilla.

Related to the roots of the teeth, especially the second premolar and first molar.

عشان هيك لو حصل مشكلة في هدول الاسنان او التهاب رح يعمللي infection ب الجيوب

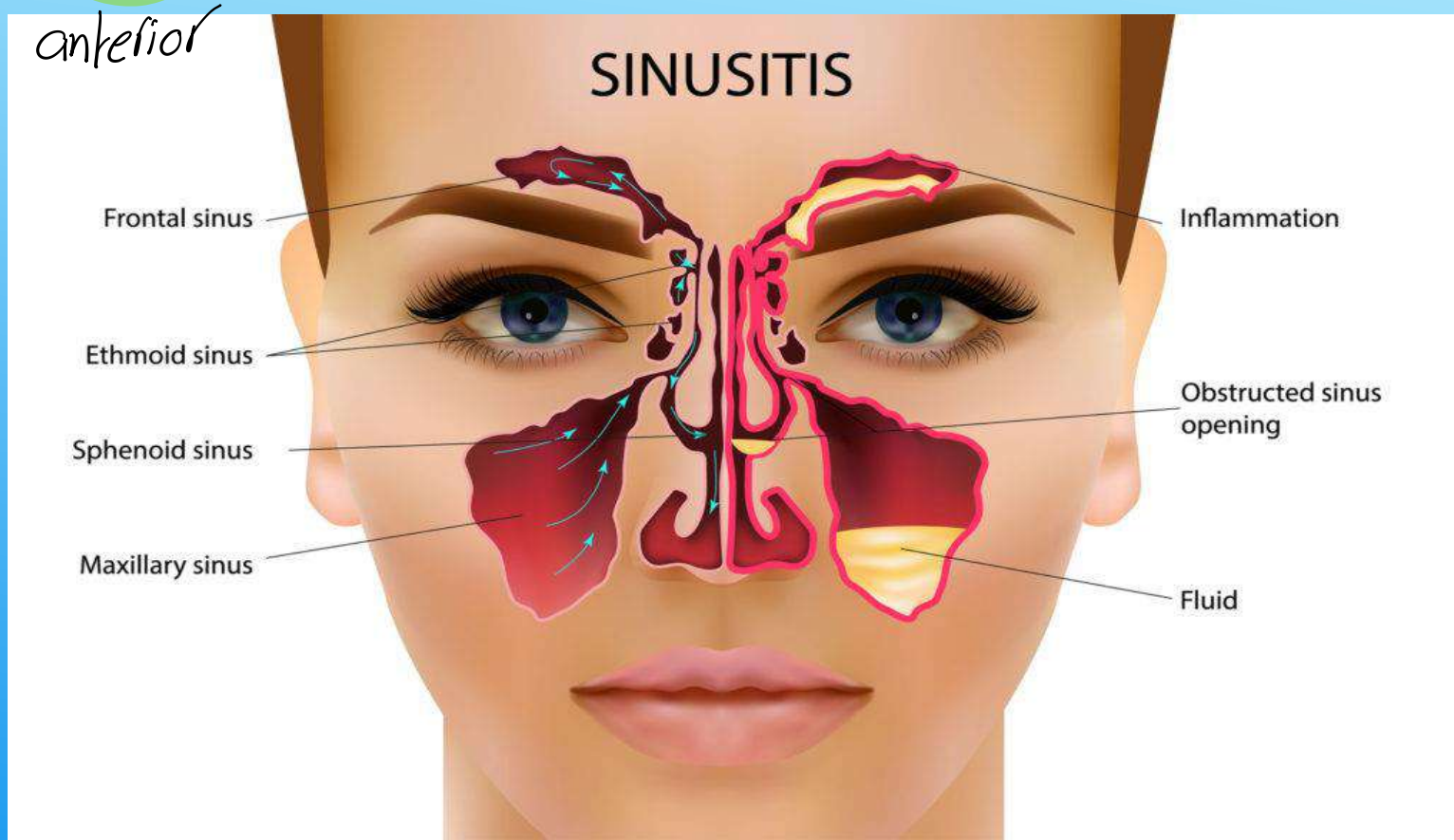
PARANASAL SINUSES



RESPIRATORY SYSTEM

The maxillary sinus

is the most susceptible to infections because of its close anatomical relation to the upper premolars and molars and the frontal and ant. Ethmoidal sinuses.



RESPIRATORY SYSTEM

The nose

The nose is the first part of the upper respiratory tract and is responsible for **warming, humidifying** and **filtering** inspired air

The nose is divided into **external nose** and **nasal cavity** (internal chamber).

Bone + cartilage

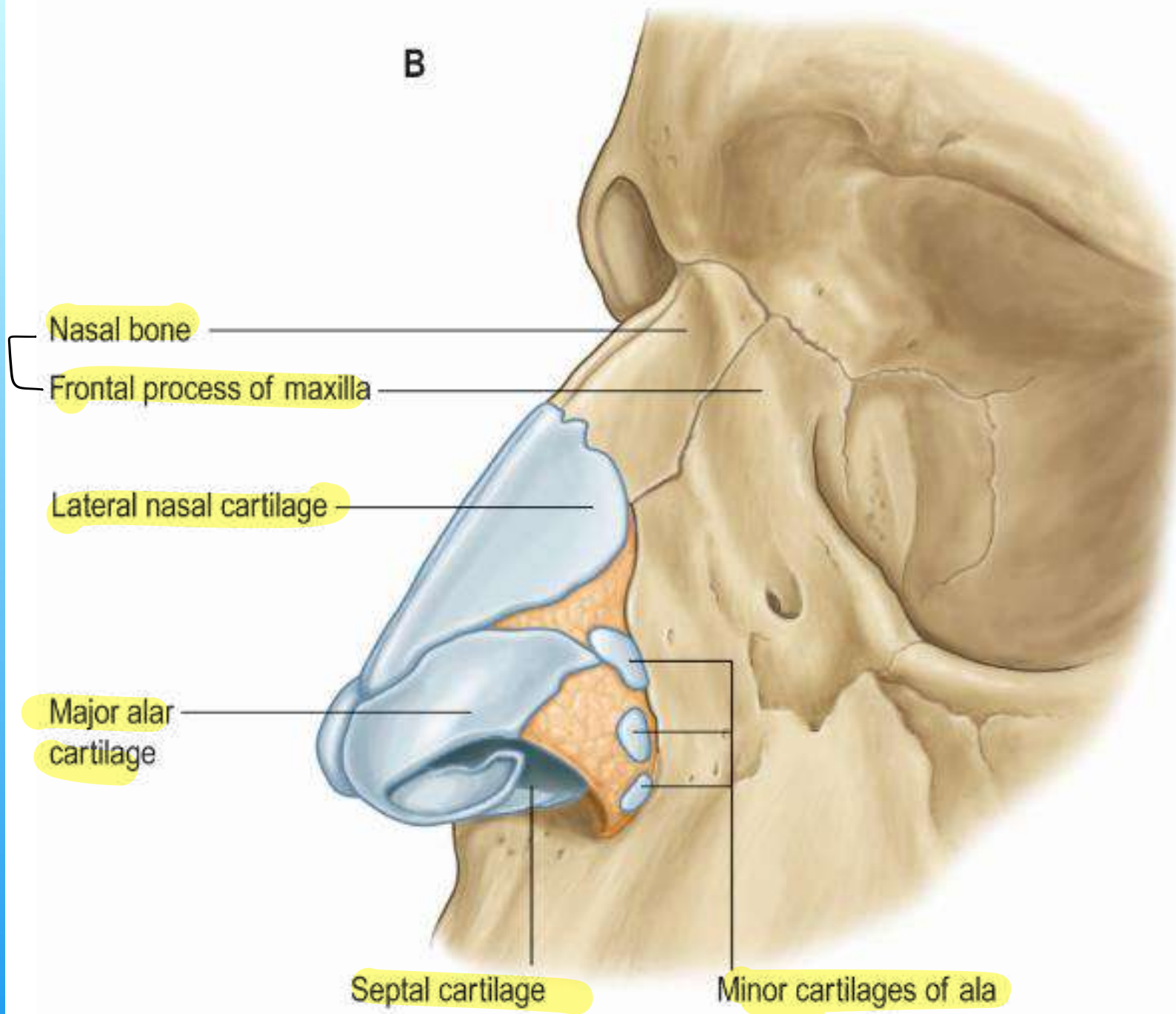
A. **External nose** opens anteriorly at the ant. **Nasal apertures** (or nostrils), and consists of:

opening,

Related to the skull.

Bony skeleton formed by nasal bones and maxilla
cartilaginous framework

B



Nasal bone

Frontal process of maxilla

Lateral nasal cartilage

Major alar cartilage

Septal cartilage

Minor cartilages of ala

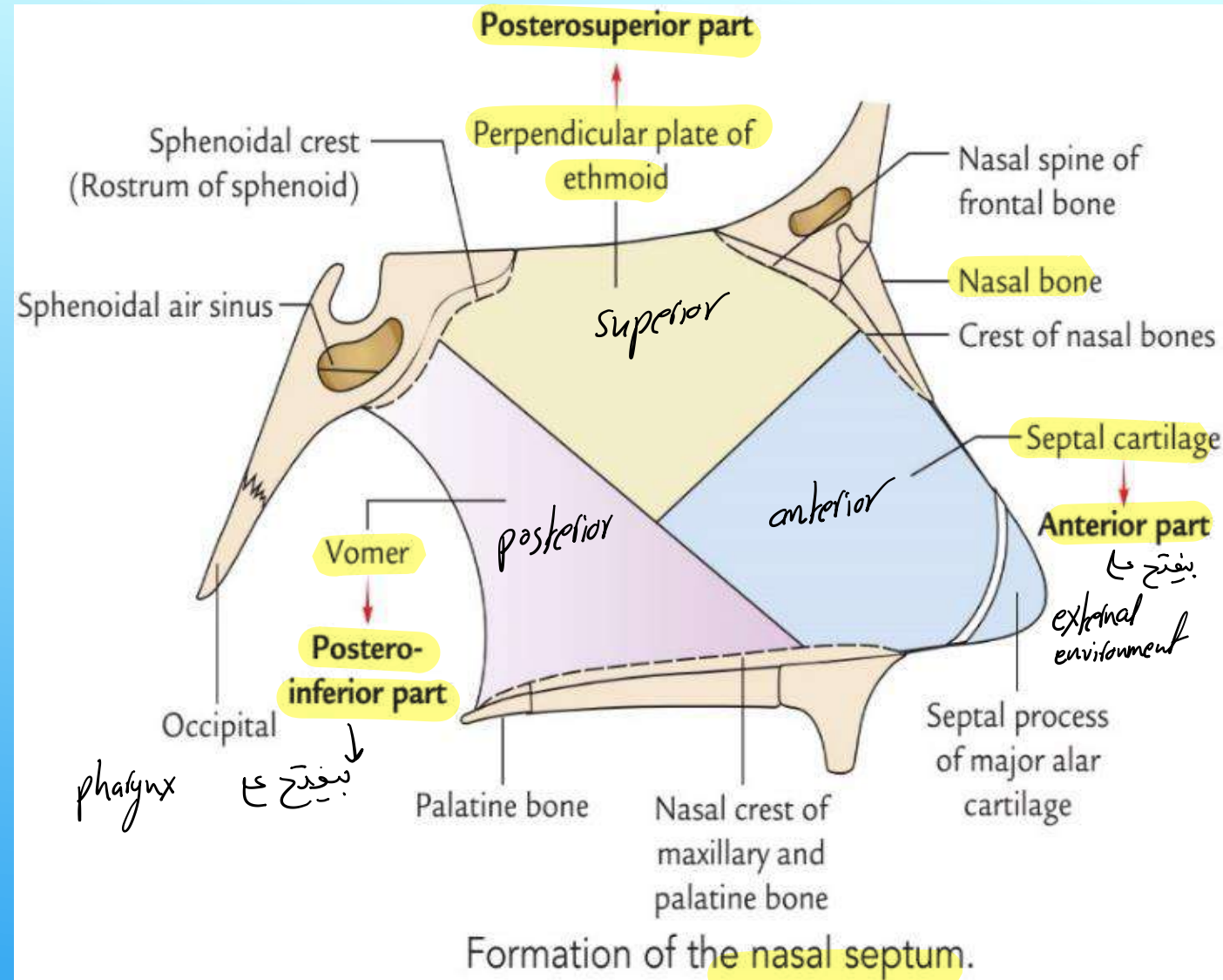
DIGESTIVE TRACT

Posteriorly opens on:

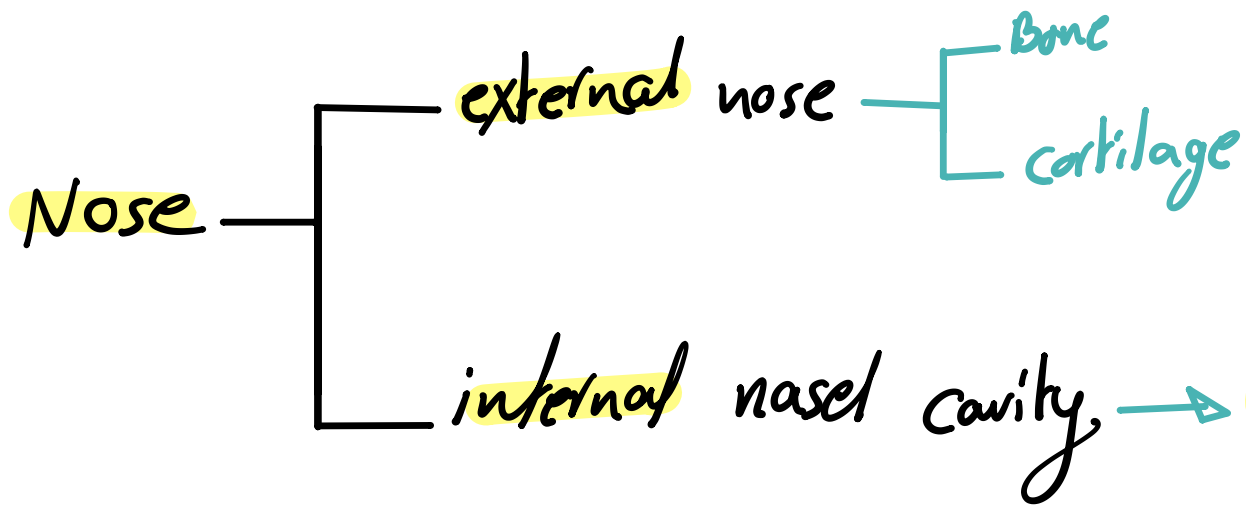
B. **The nasal cavity** of the nose is divided into two cavities that are separated into Rt and Lt cavities by the nasal septum.

nose → RT
 → LT

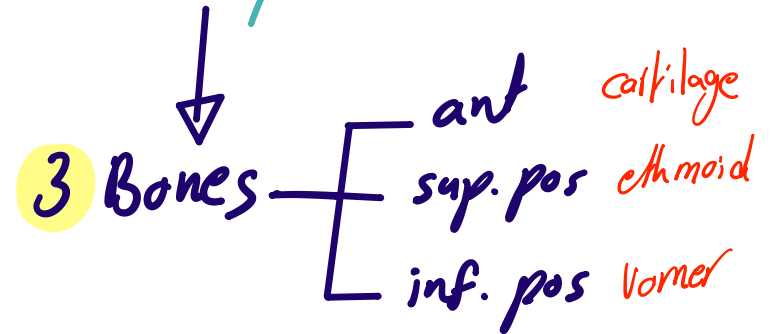
Opens posteriorly into the nasopharynx by the post. Nasal apertures



تعالوا شوی نازخه شو حکینا عن -: nose



2 cavities separated by nasal septum

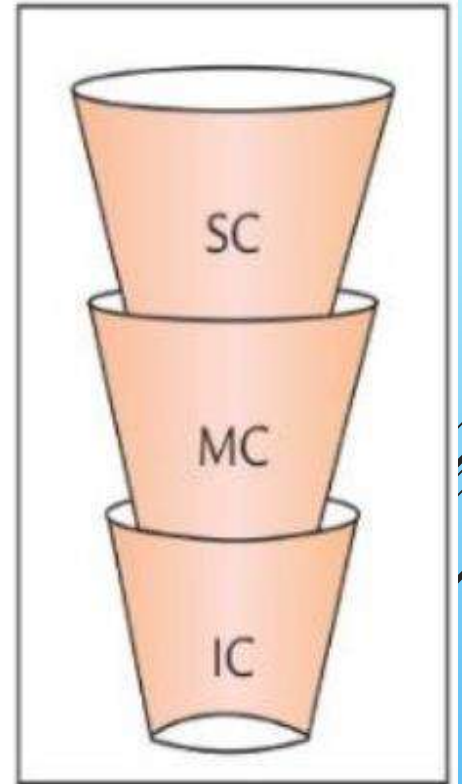
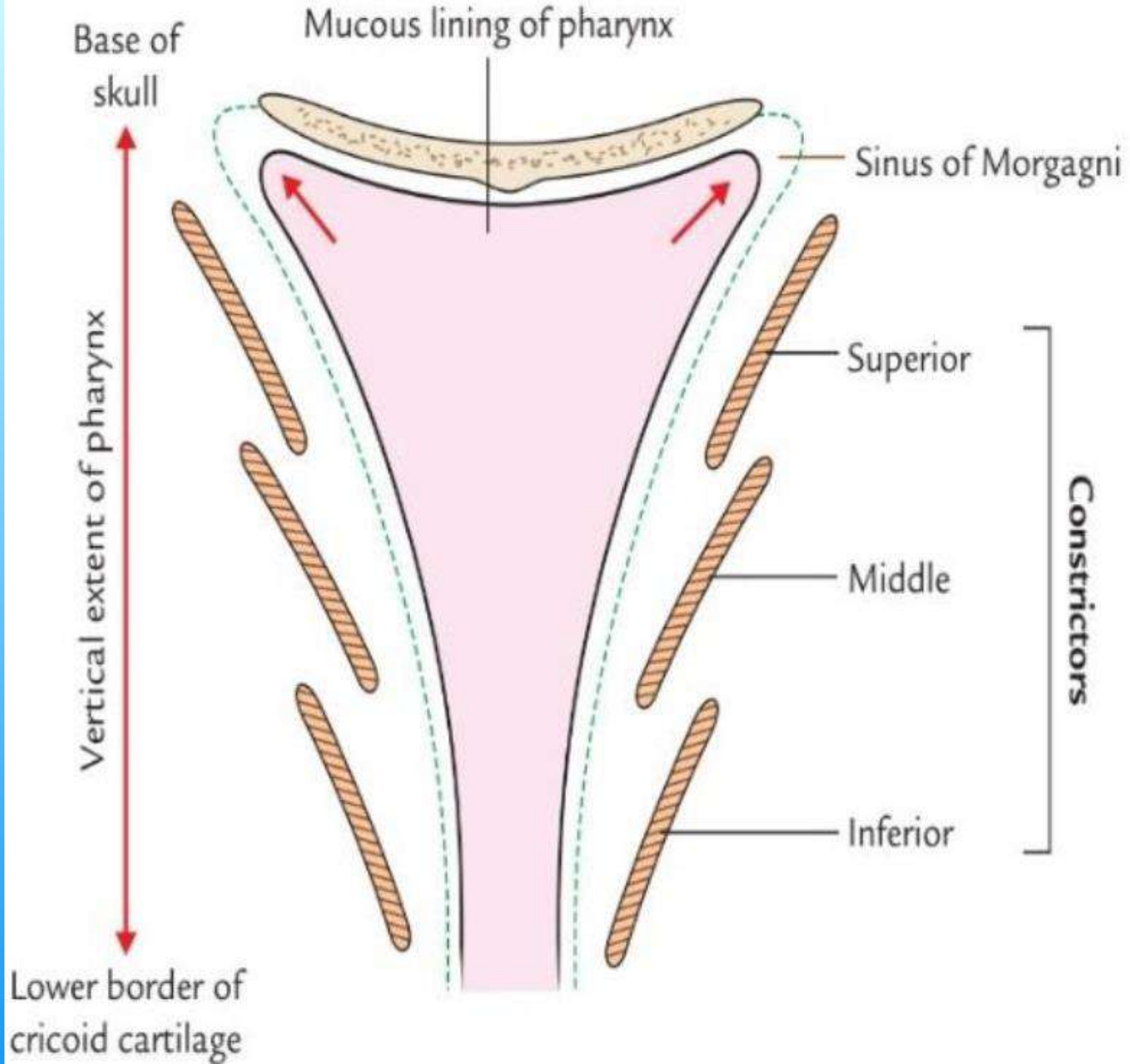


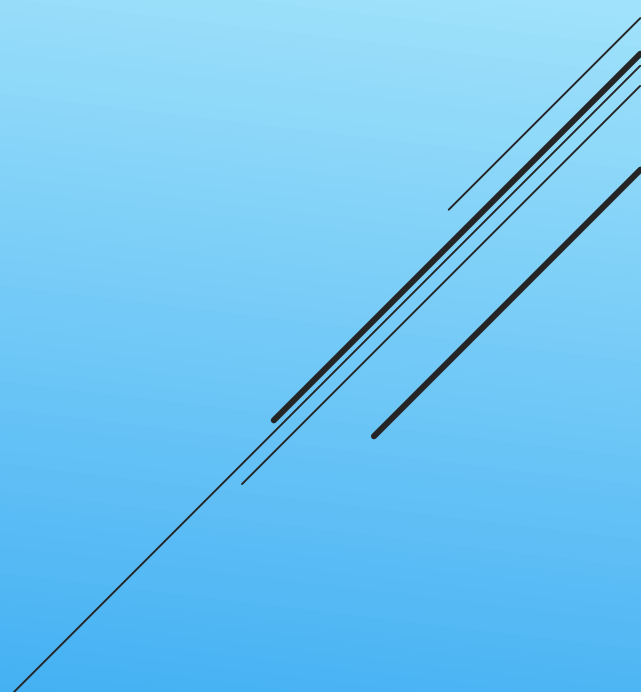
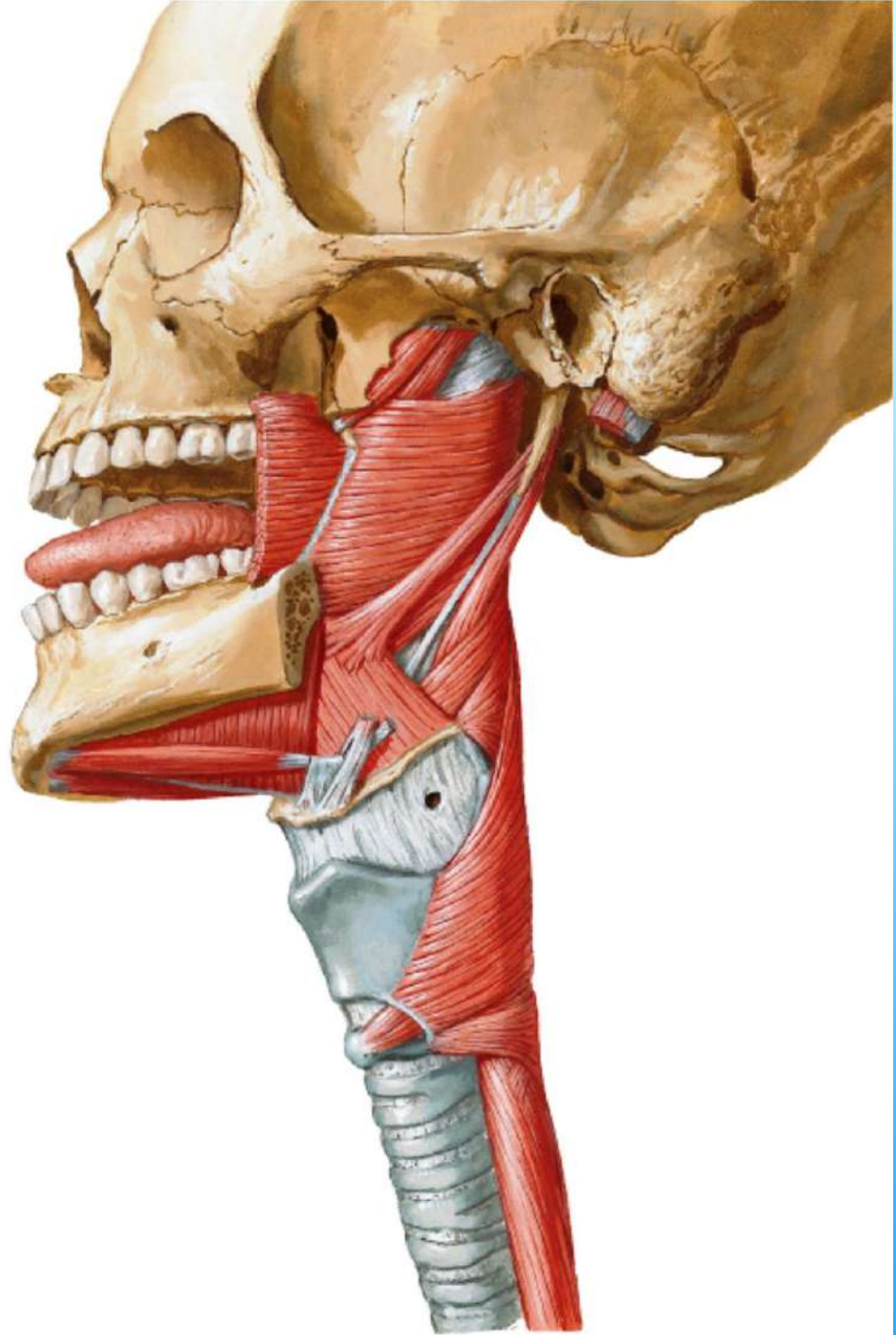
posteriorly opens on nasopharynx

DIGESTIVE TRACT

Pharynx → fully explained in GIT

- ❑ **Definition:** it is a muscular tube Extending from base of skull to the lower border of C6 vertebra.
- ❑ **Size & shape:** 5 inches long & funnel shaped.
- ❑ **The wall of the pharynx has:**
 - Three circular muscles (superior, middle and inferior constrictors)
 - Three longitudinal muscles (stylopharyngeus, palatopharyngeus, and salpingopharyngeus muscles).
- ❑ **The main function of the pharynx:** It receives bolus of food from oral cavity and directs it to the esophagus.





DIGESTIVE TRACT

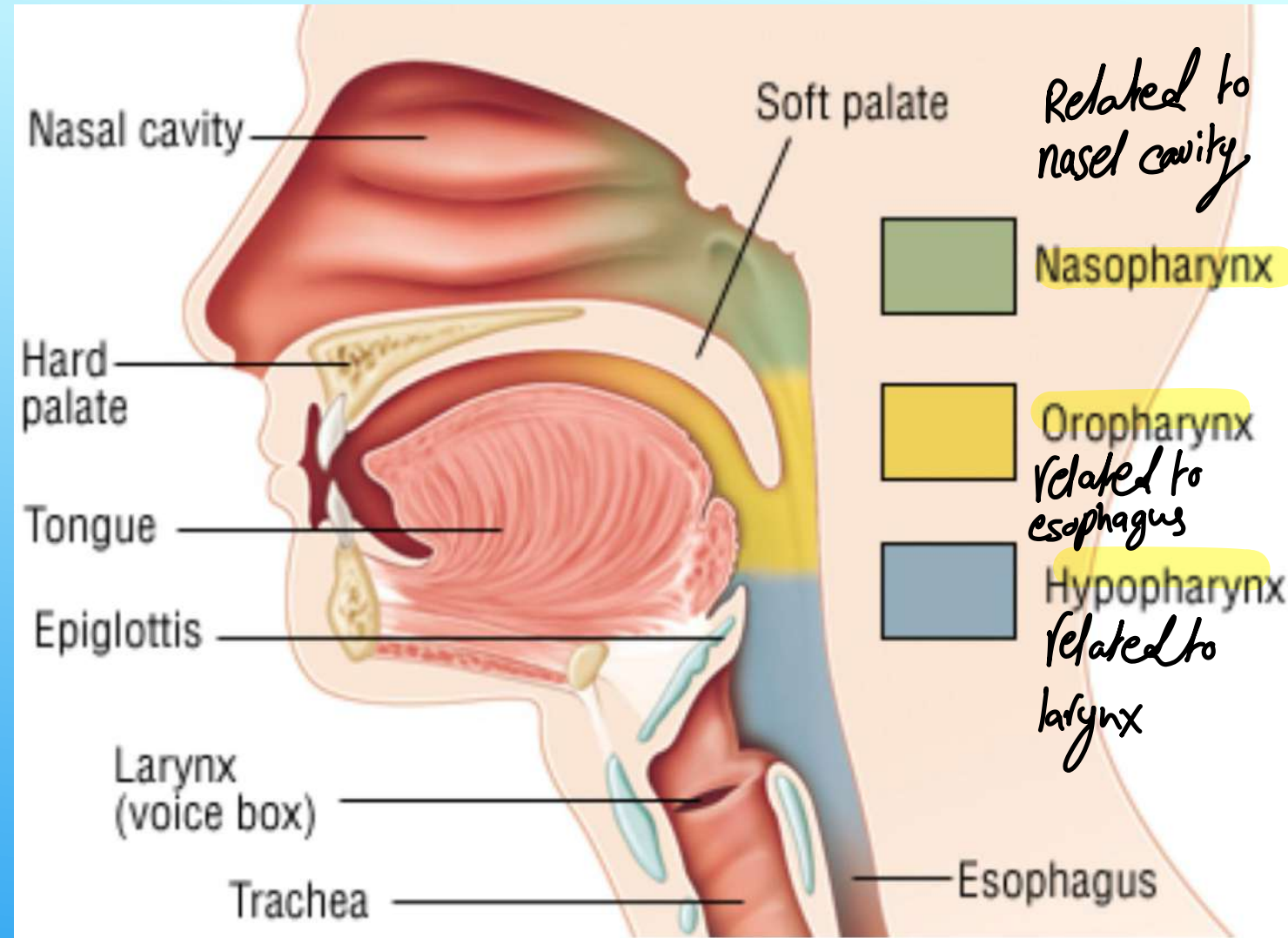
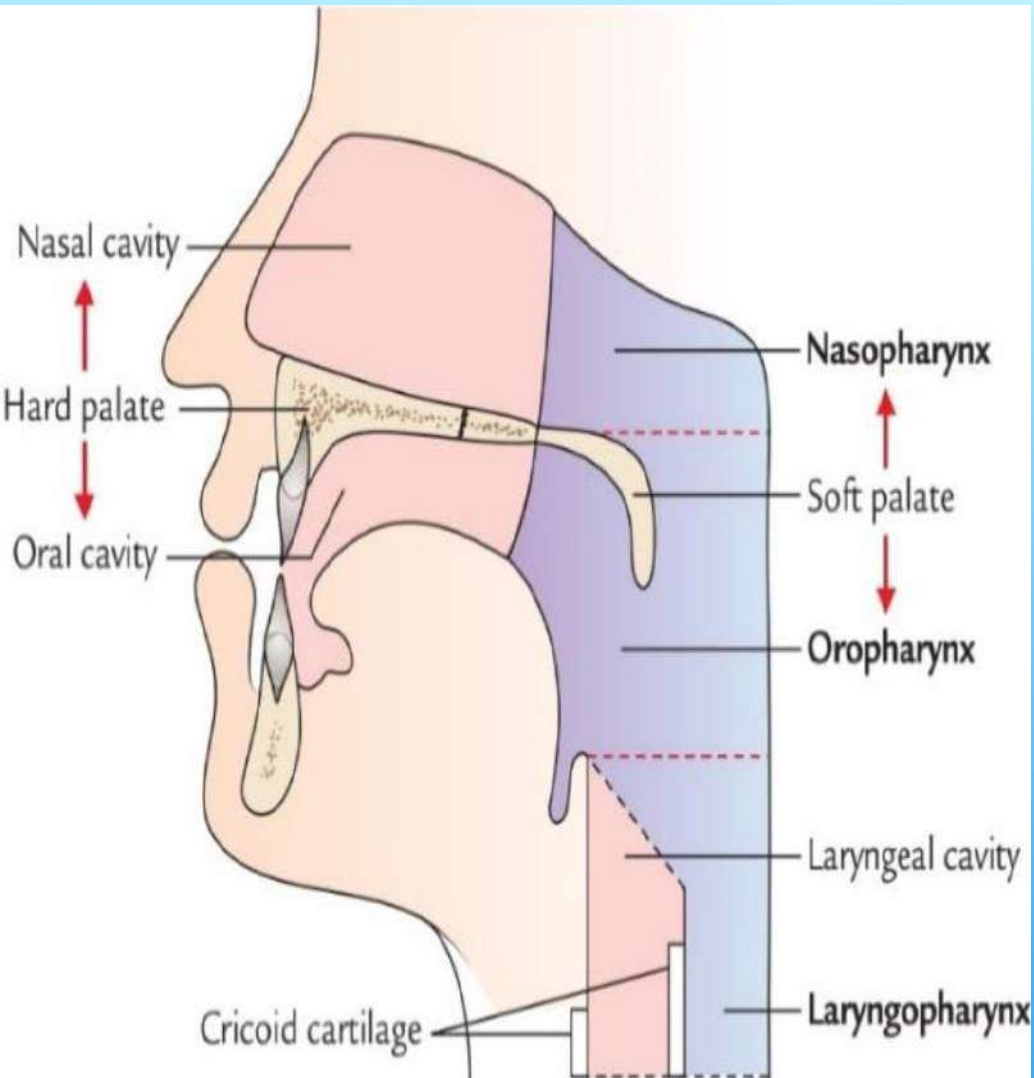
گٹ انڈکشن

Function of the pharynx:

- The successive contraction of the constrictor muscles propels the bolus of food down into the esophagus.
- The longitudinal muscles elevate the pharynx and larynx during swallowing.

DIGESTIVE TRACT

Parts of the pharynx



RESPIRATORY SYSTEM

متذكرين لما حكينا كيف بدنا نضخم الصوت لازم نحطه في تجويف زي مثلاً الآلات الموسيقية، ف عندي هاد ال voice box يكون اسطواني الشكل و جواته اوتار، هي vocal folds يلي هي الحبال الصوتية

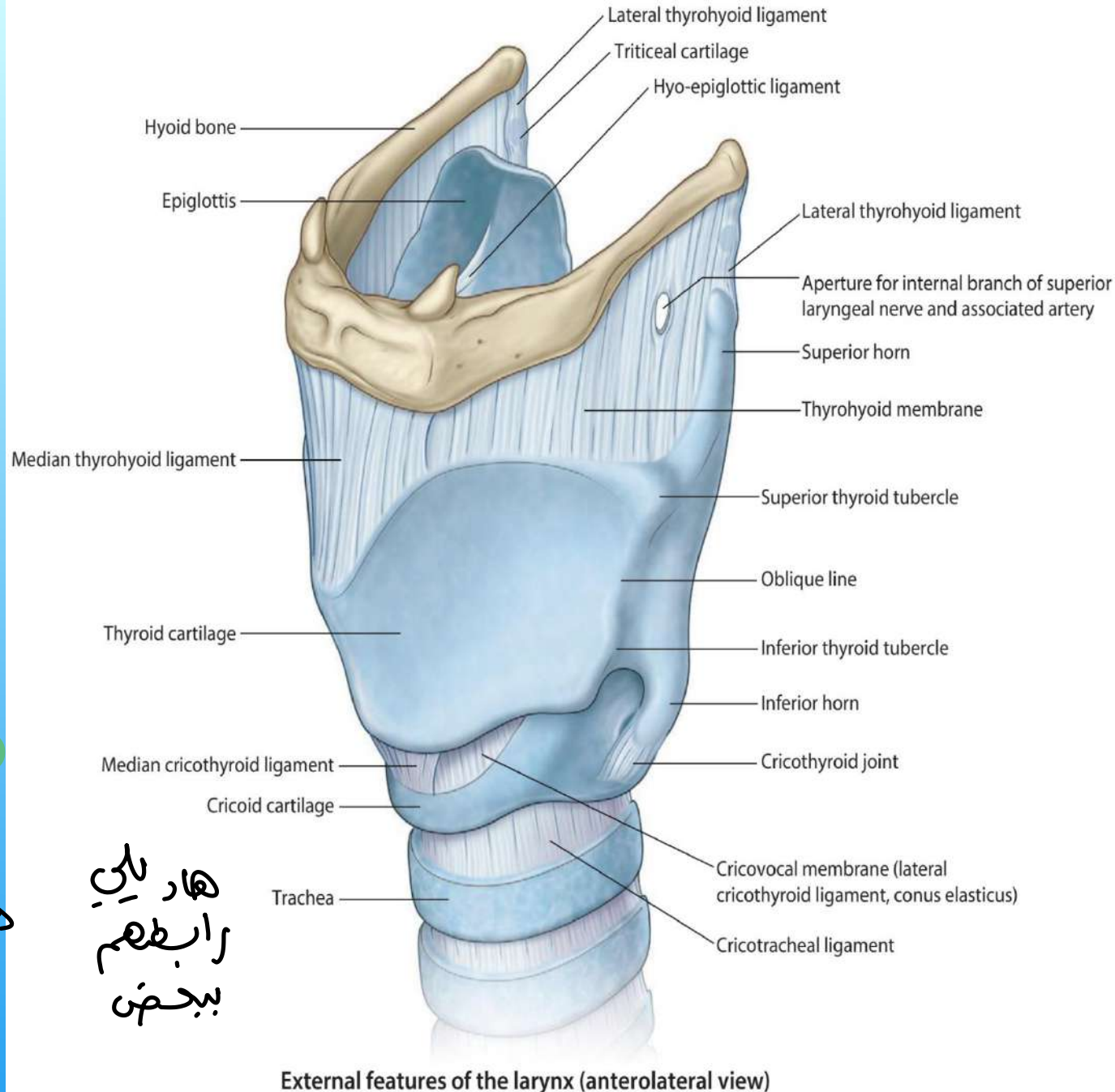
الحنجرة

Larynx (voice Box)

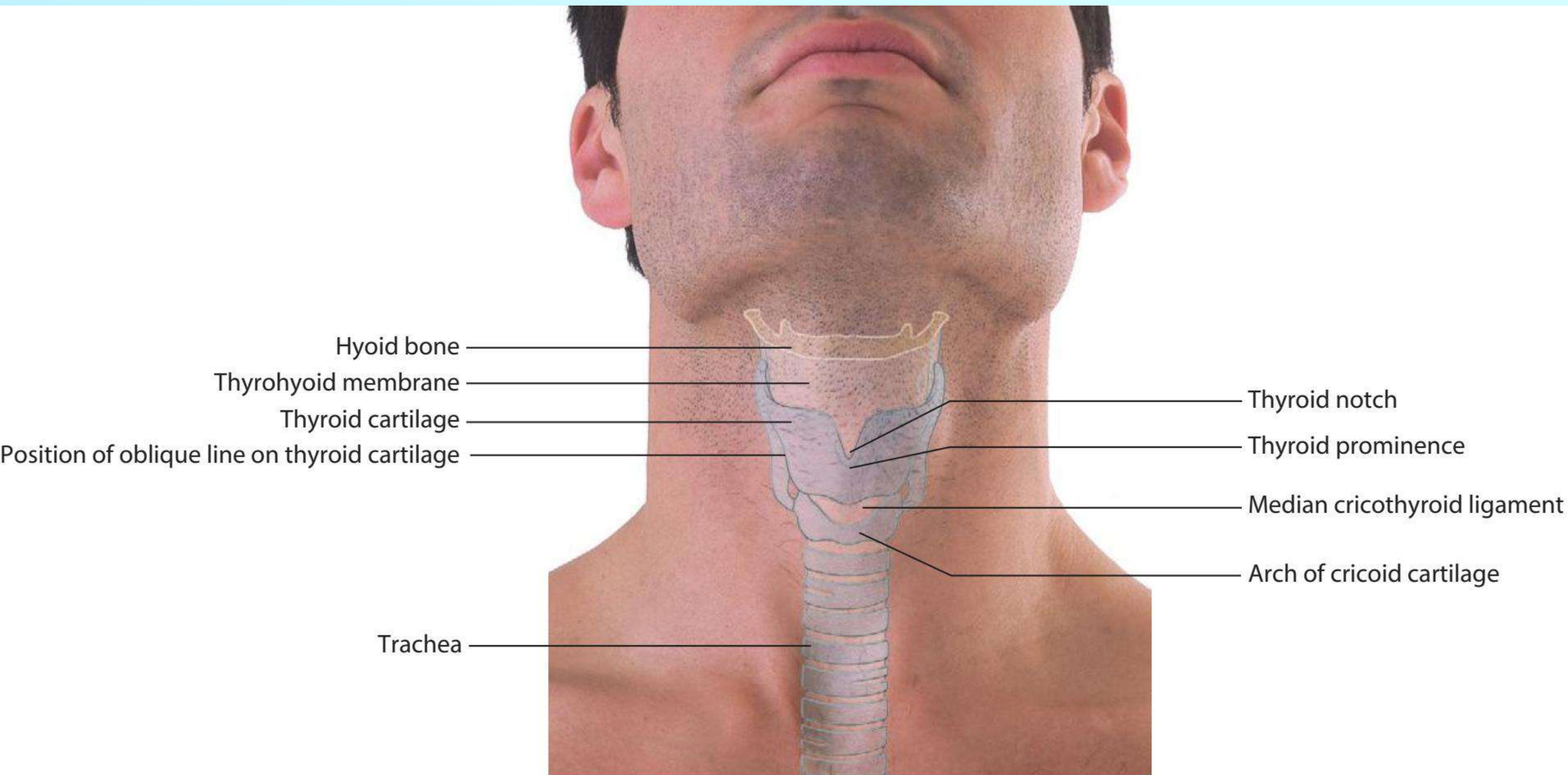
It connects the laryngopharynx with the trachea.

The lumen of larynx is kept patent by its rigid walls formed by hyaline and elastic cartilages that are united by membranes.

Cartilage → Hyaline } Types of cartilages.
 → elastic }

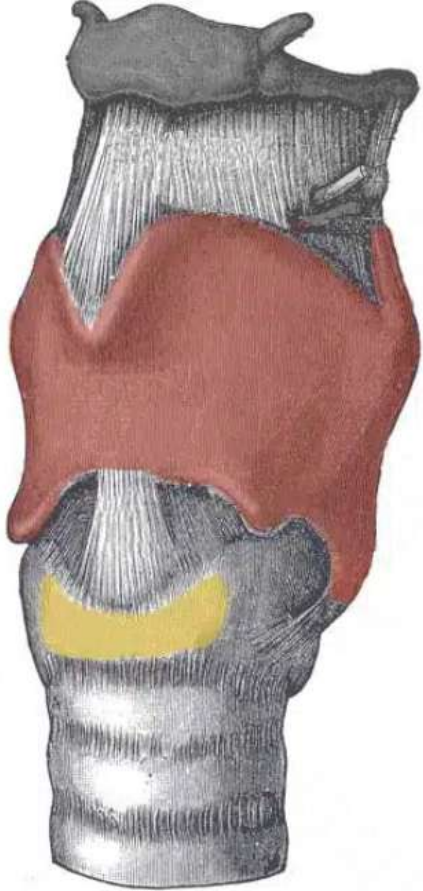


هاد يلي
رابطهم
ببعض

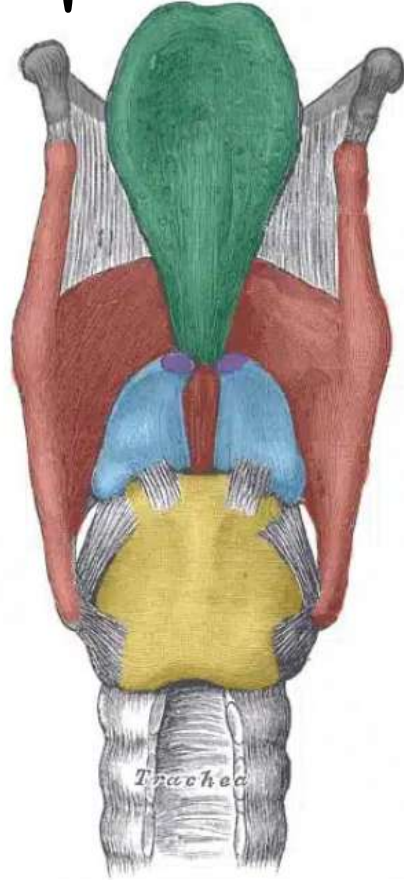







Position of larynx in the neck as it relates to the surface

Ant



Pos



- | | |
|---|------------------------|
|  | Epiglottis |
|  | Thyroid cartilage |
|  | Arytenoid cartilages |
|  | Cricoid cartilage |
|  | Corniculate cartilages |

هياكل صلبة خارجية

ليس متساوكم

لتعرفوا مواضع

Cartilages بالزبط

RESPIRATORY SYSTEM

□ The cartilages of the larynx are **nine**;

طالعة من thyroid ورافعة لقوق ، بتفتح وبتسكر عشان تمنع الاكل بدخل
للRespiratory tract وبتشبهه ورق الشجر

شبه الفراشة

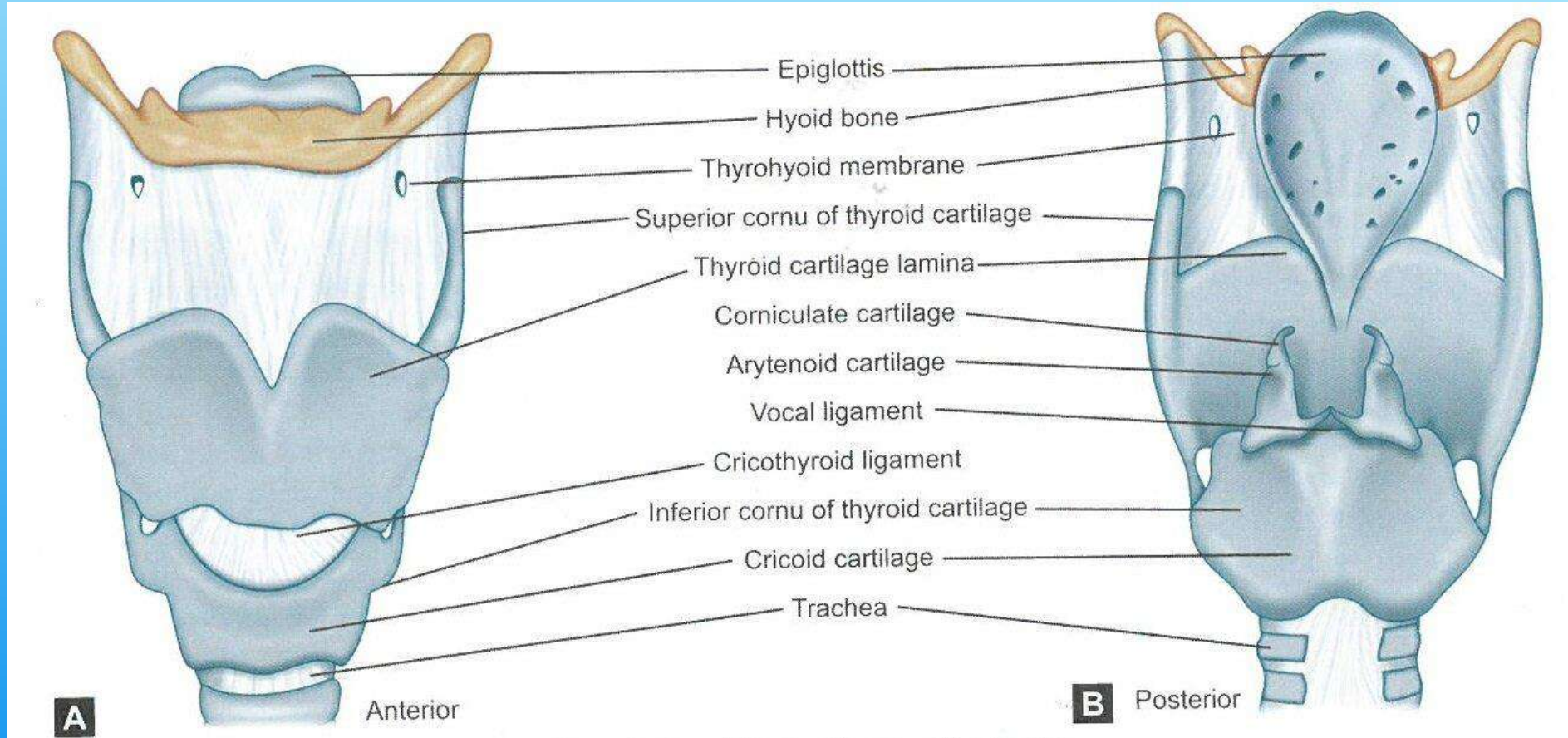
شبه الخاتم

ببعلوا البر مسامة
من larynx

◆ **Three are unpaired**:- epiglottis, thyroid and cricoid.

◆ **Three are paired (6)**:- arytenoid, corniculate and cuneiform.

الها وظيفه مهمه في عملية انتاج الصوت مسؤولة عن شد الاحبال الصوتية

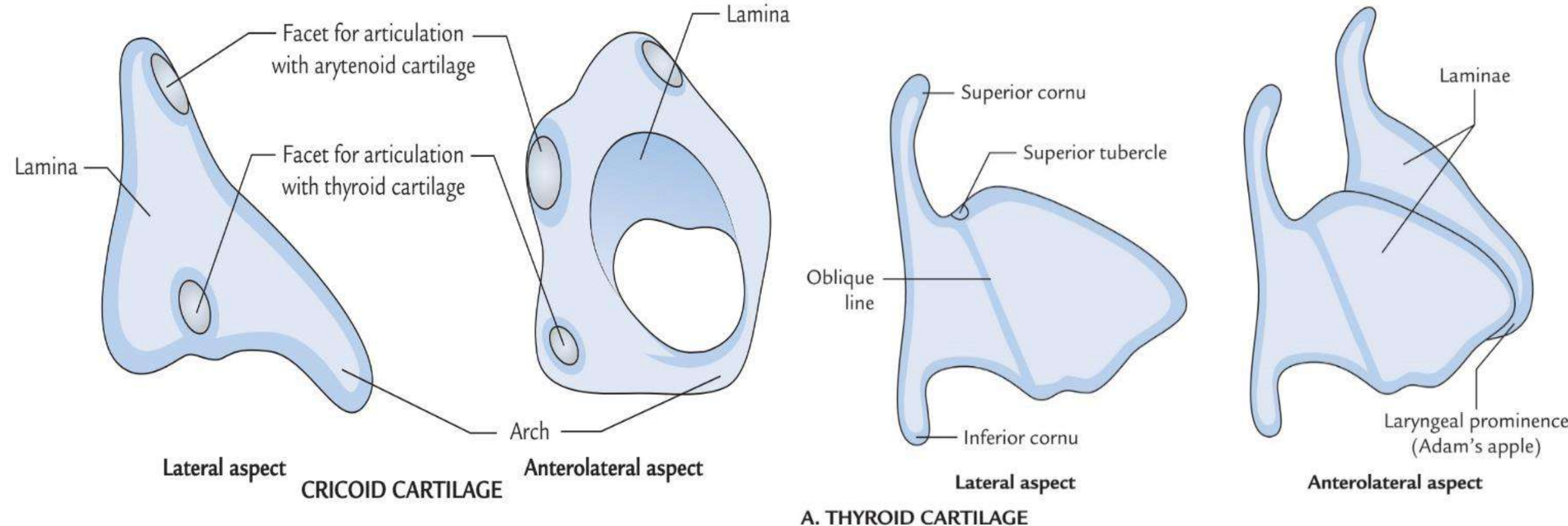


RESPIRATORY SYSTEM

عامل بروز وإله دور رئيسي في الصرخ

هو برضو اله علاقة بانه صوت الرجال يكون
اضخم من صوت النساء نتيجة تأثير الهرمونات
فهما بخلوا الاوتار الصوتية اطول و بكبروا حجم
ال larynx

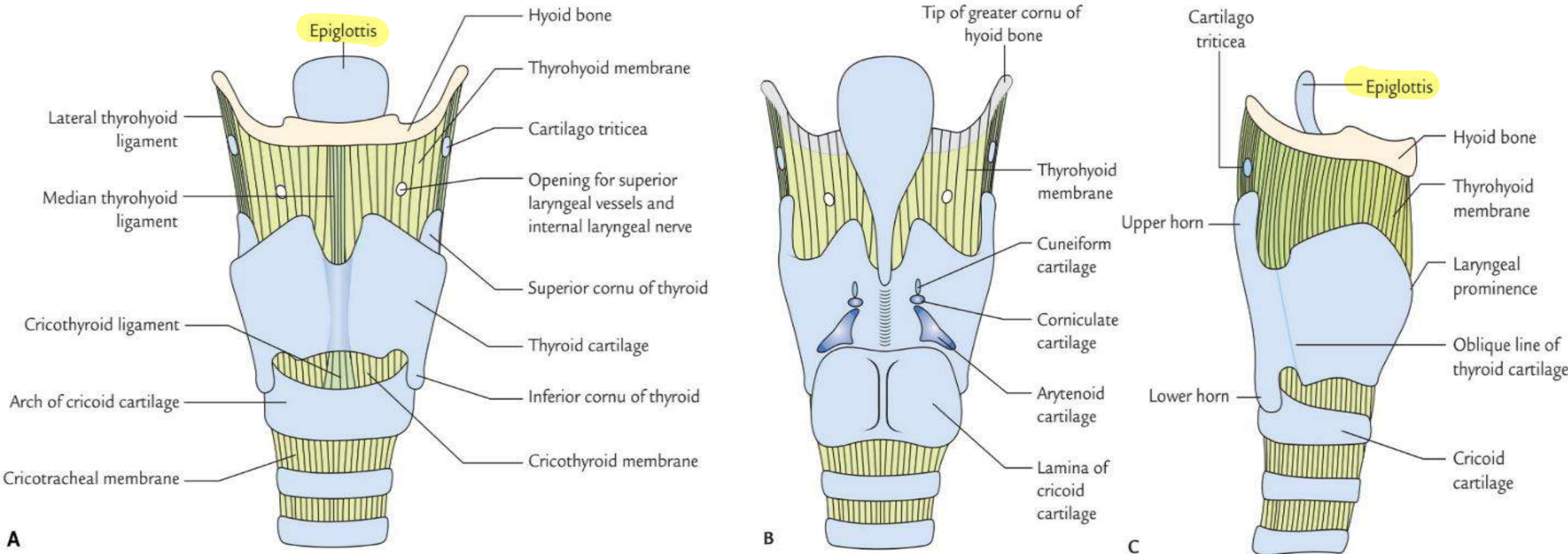
- The thyroid cartilage is the largest and forms prominence on the front of neck (Adam's apple) in males.
- The cricoid cartilage completely encircles the lumen of larynx.



RESPIRATORY SYSTEM

□ **Epiglottis:** a thin, leaf-like plate of elastic cartilage that projects obliquely upwards behind the tongue and hyoid body, and in front of the laryngeal inlet.

هاد بيطلع و بينزل ف اله علاقة بانه يقفل مجرى التنفس عشان ما يدخل الاكل فيه اثناء عملية البلع



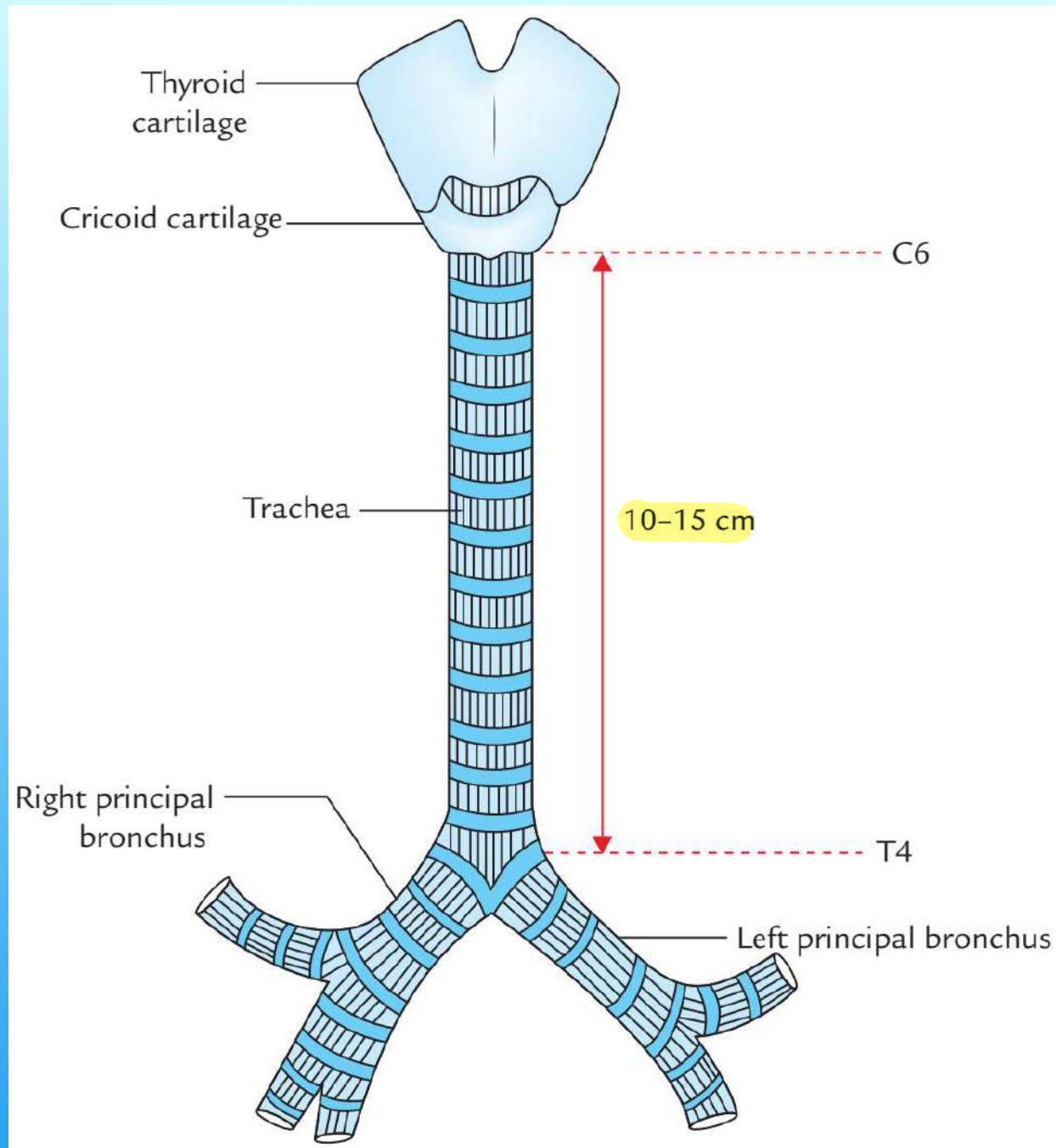
Skeleton of the larynx: A, anterior view; B, posterior view; C, lateral view.

RESPIRATORY SYSTEM

هاد الجزء يلي بكملة بعد larynx

The Trachea

- **Length: 10 cm.**
- **Site:** its **Upper half** lies in **the neck** its **lower half** in the **thorax**
- **Course:** مهم جدًا لاسئلة:
 - > It **starts** as a **continuation** of **larynx** at the level of **C6**
 - > Runs **downward** in front of the **vertebral Column** separated from it by **esophagus**

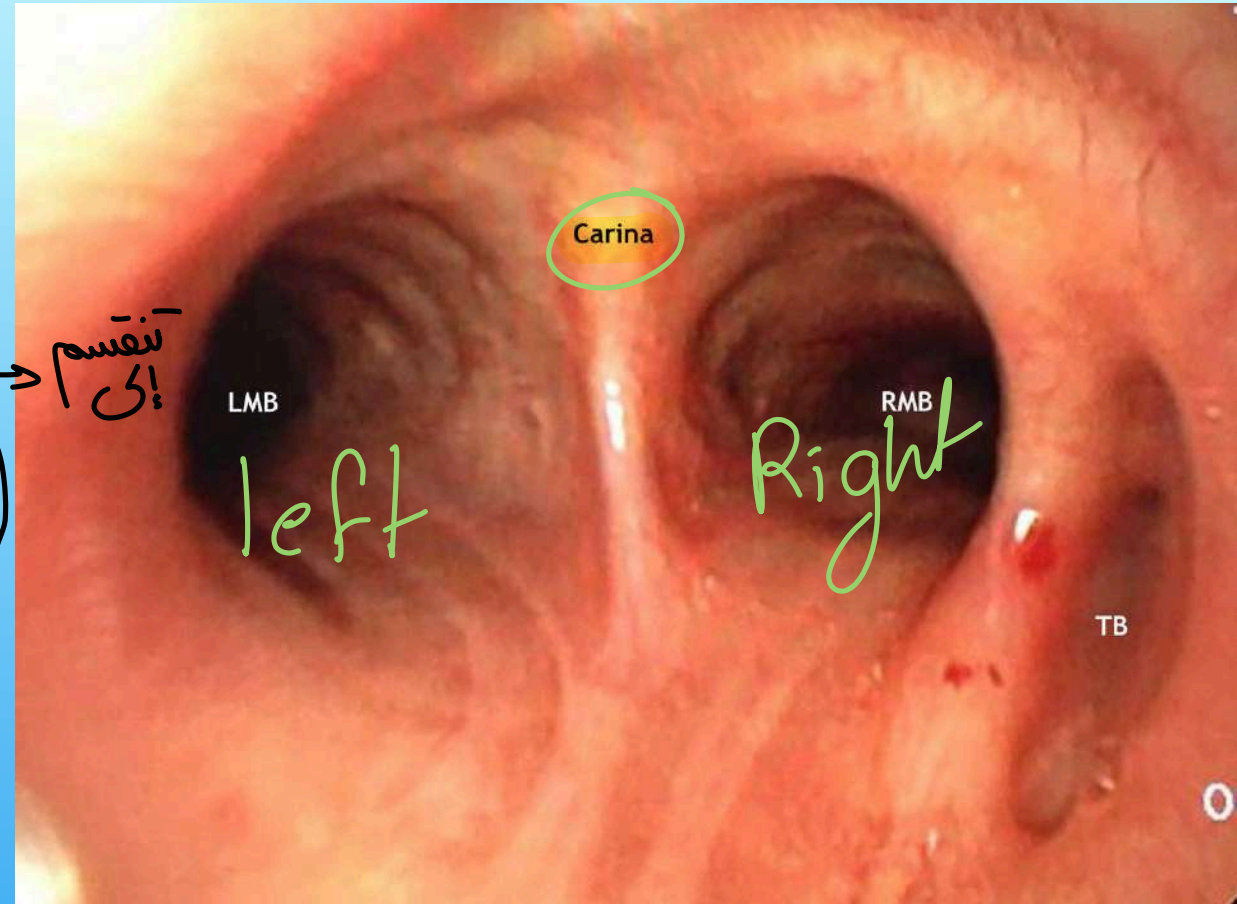


RESPIRATORY SYSTEM

> Ends at the level of the lower border of T4 vertebra about 5 cm (2 in.) below the jugular notch. The trachea bifurcates into a right and left bronchi. (main)

□ The tracheal bifurcation is marked by a cartilaginous spur, the carina.

→ mark of Bifurcation of trachea.

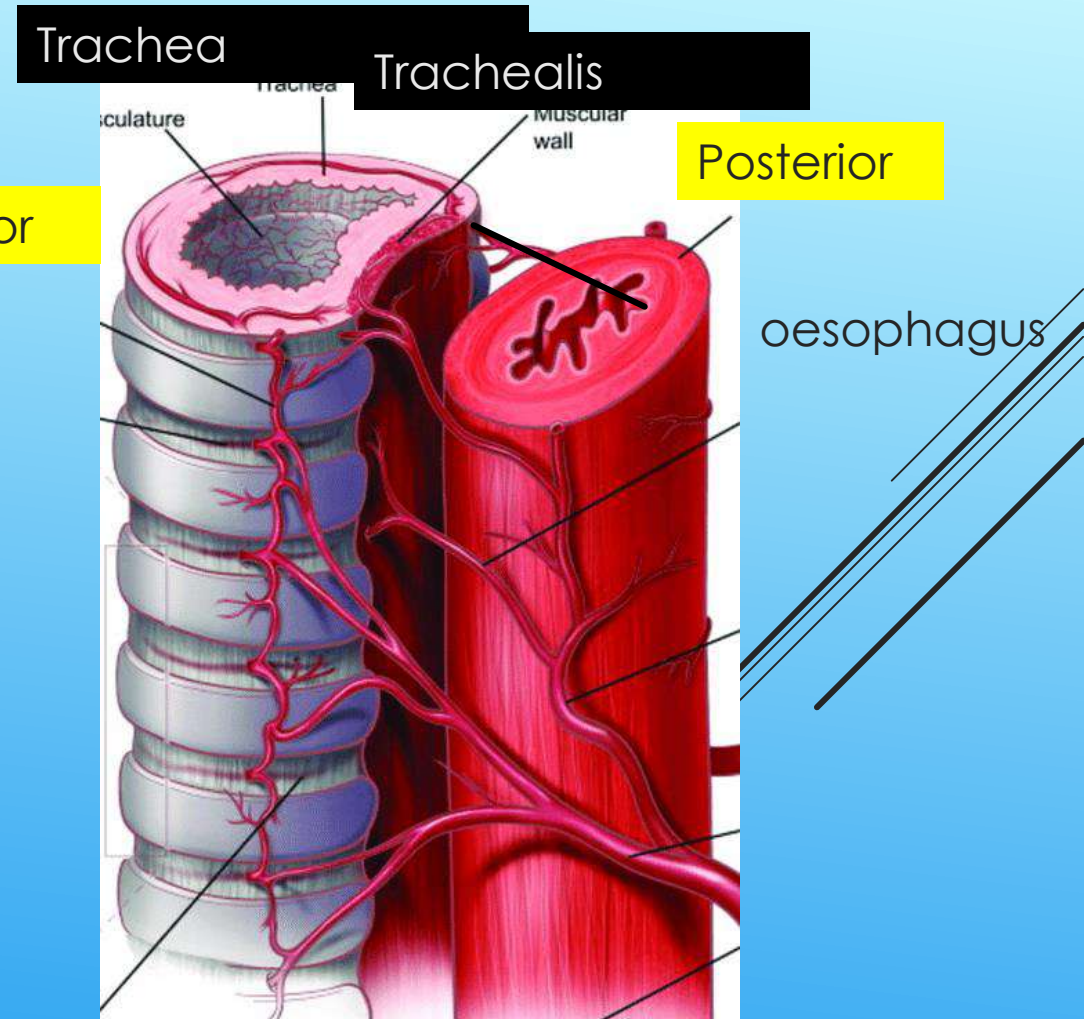


RESPIRATORY SYSTEM

□ The lumen of trachea is kept patent by 16-20 incomplete C-shaped rings of hyaline cartilages.

esophagus - oesophagus

→ number of rings.



RESPIRATORY SYSTEM

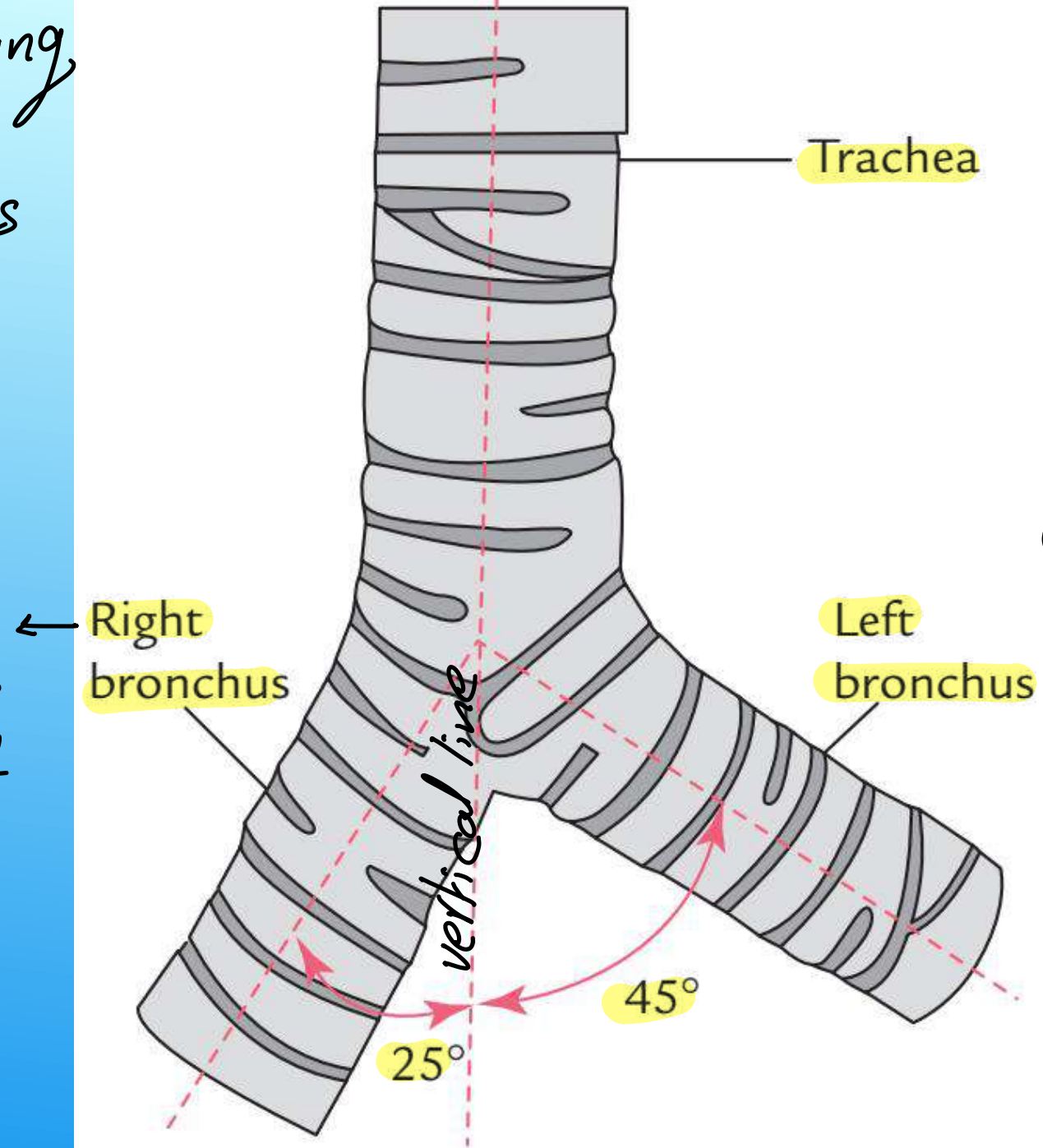
BRONCHI

- The two bronchi arise from the lower end of trachea at the level of lower border of the 4th thoracic vertebra.
- Each branch passes downward and laterally to the hilum of the corresponding lung.

Right bronchi	Left bronchi
Shorter (about one inch).	Longer (about 2 inch).
Wider. أوسع	Narrower. أضيق
More vertical nearly in line with trachea.	More oblique (not in line with trachea)
It divides into 3 bronchi. One for each lobe of lung	It divides into two bronchi: one for each lobe of lung

Right lung > left lung
 ↓ ↓
 3 lobes 2 lobes

more inline with trachea.
 یعنی اقرب

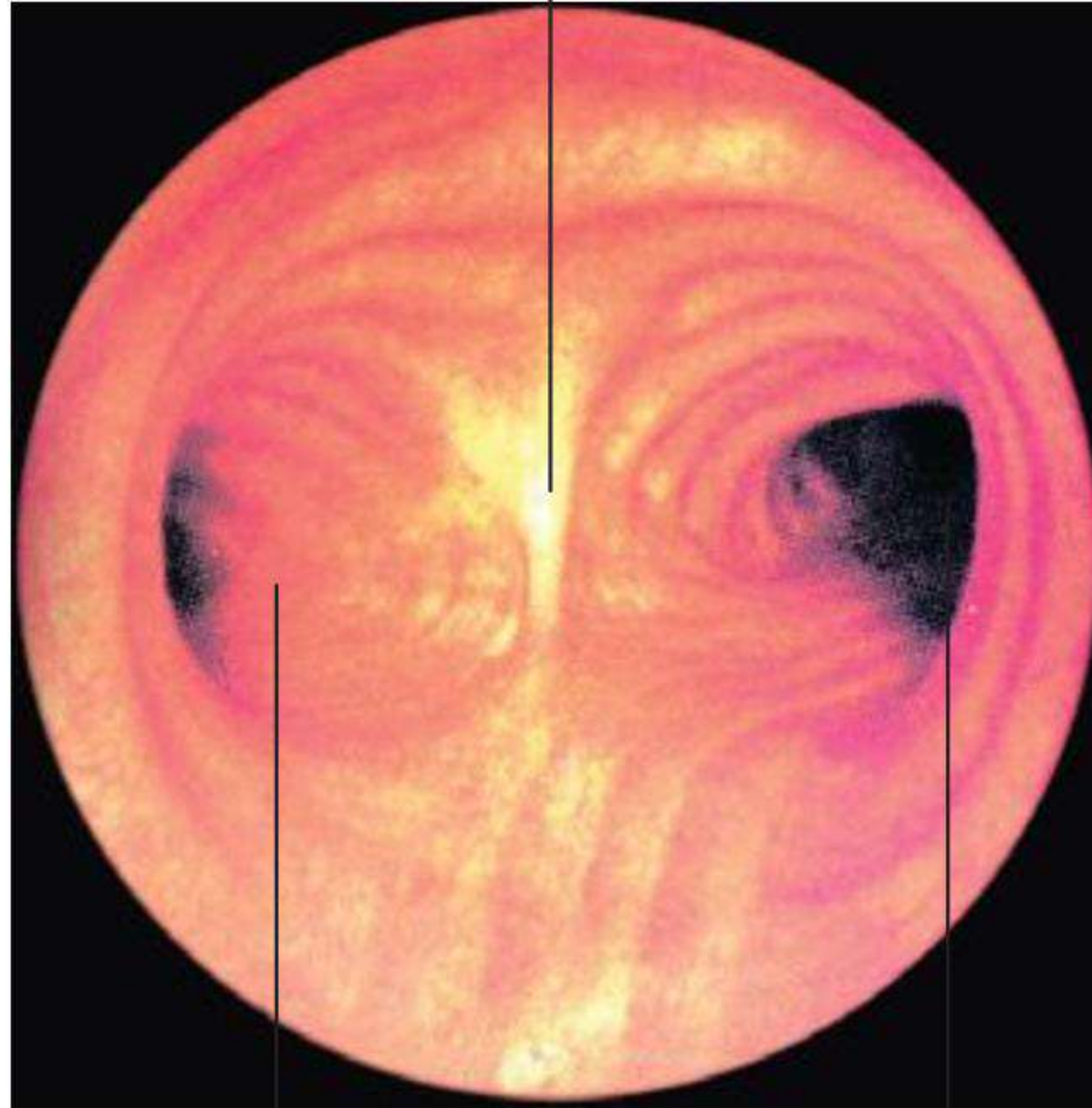


* لما جی سوال :
 explain why foreign body impacted in Right ?
 لڈنفا more inline + wider

بقدر اثر حبابیسا، اناعتی طفل
 بلع جسم صخری و فریب و دخلی
 Respiratory tract ، هاد الجسم لوین رح

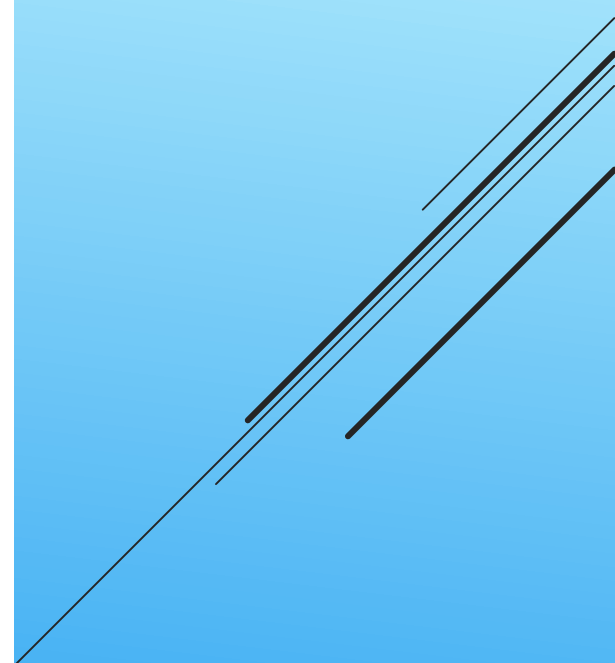
برنجی ؟ Right ، لیجہ ؟
 wider + more inline with trachea.

Carina



Left main bronchus

Right main bronchus



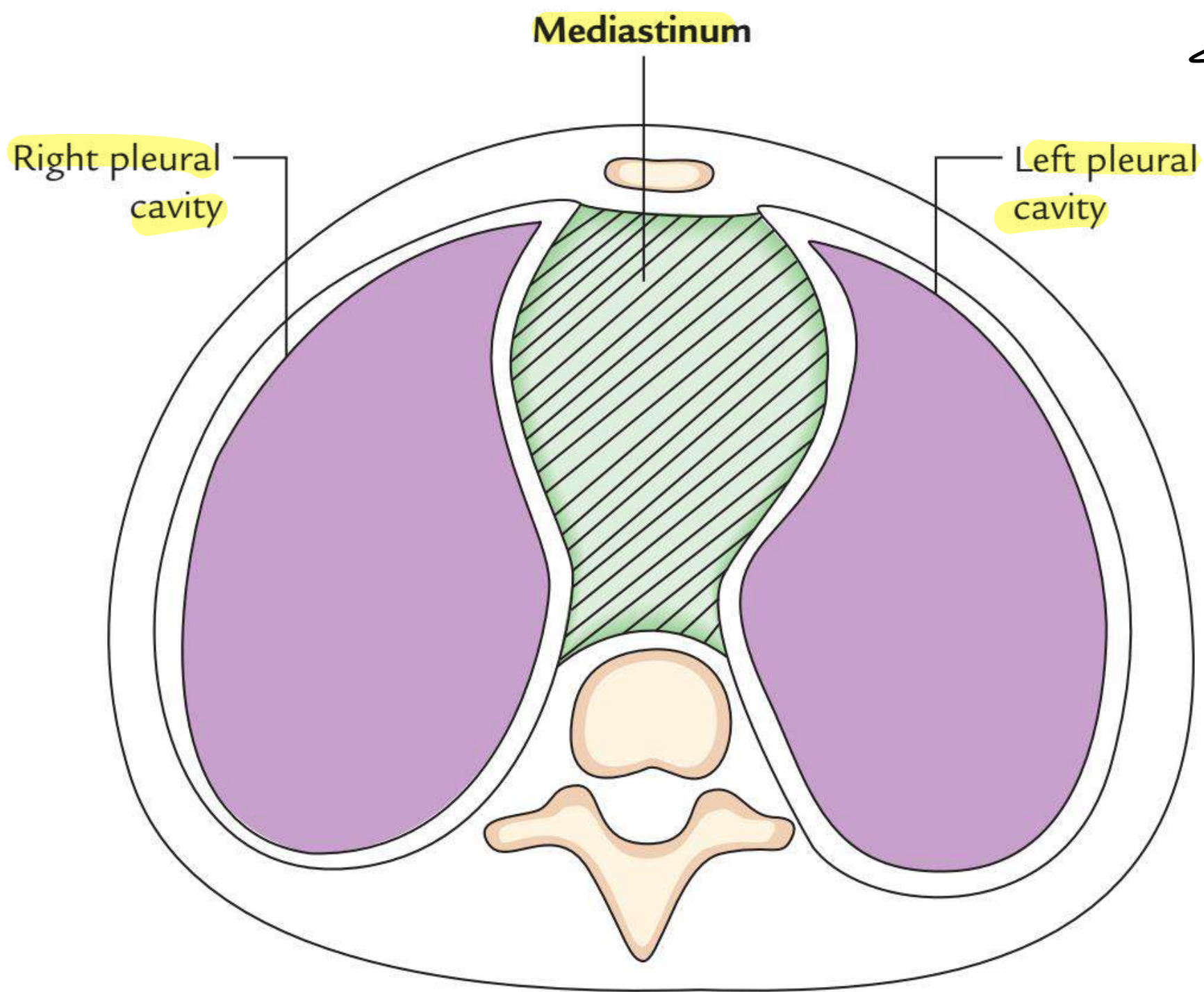
RESPIRATORY SYSTEM

خلينا شوي نحكي عن thoracic cage و هو عبارة
عن cavity مقسوم الى ثلاثة اجزاء ، جزء يمين و
جزء شمال و واحد في الوسط هو mediastinum
RT compartment : RT lung + plural
LT compartment: LT lung & LT plural
Mediastinum: esophagus , Blood
vessels

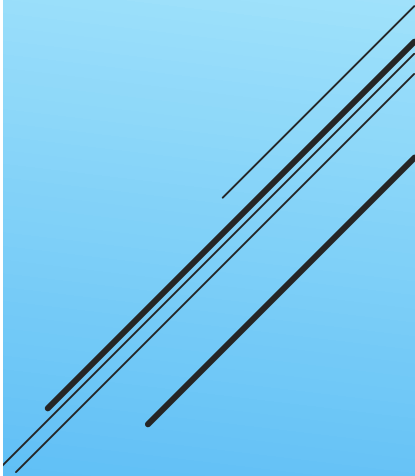
Lungs

RT + LT

- There are **two lungs**, lying in the pleural cavities, separated by mediastinum
- **Shape**: Each lung is **Cone-Shaped**, and has
 1. **An apex**: the upper end *على شكل مخروط*
 2. **a base**: resting on the diaphragm *related to ribs*
 3. **two surfaces**: costal and medial
 4. **three borders**: anterior, posterior and inferior .

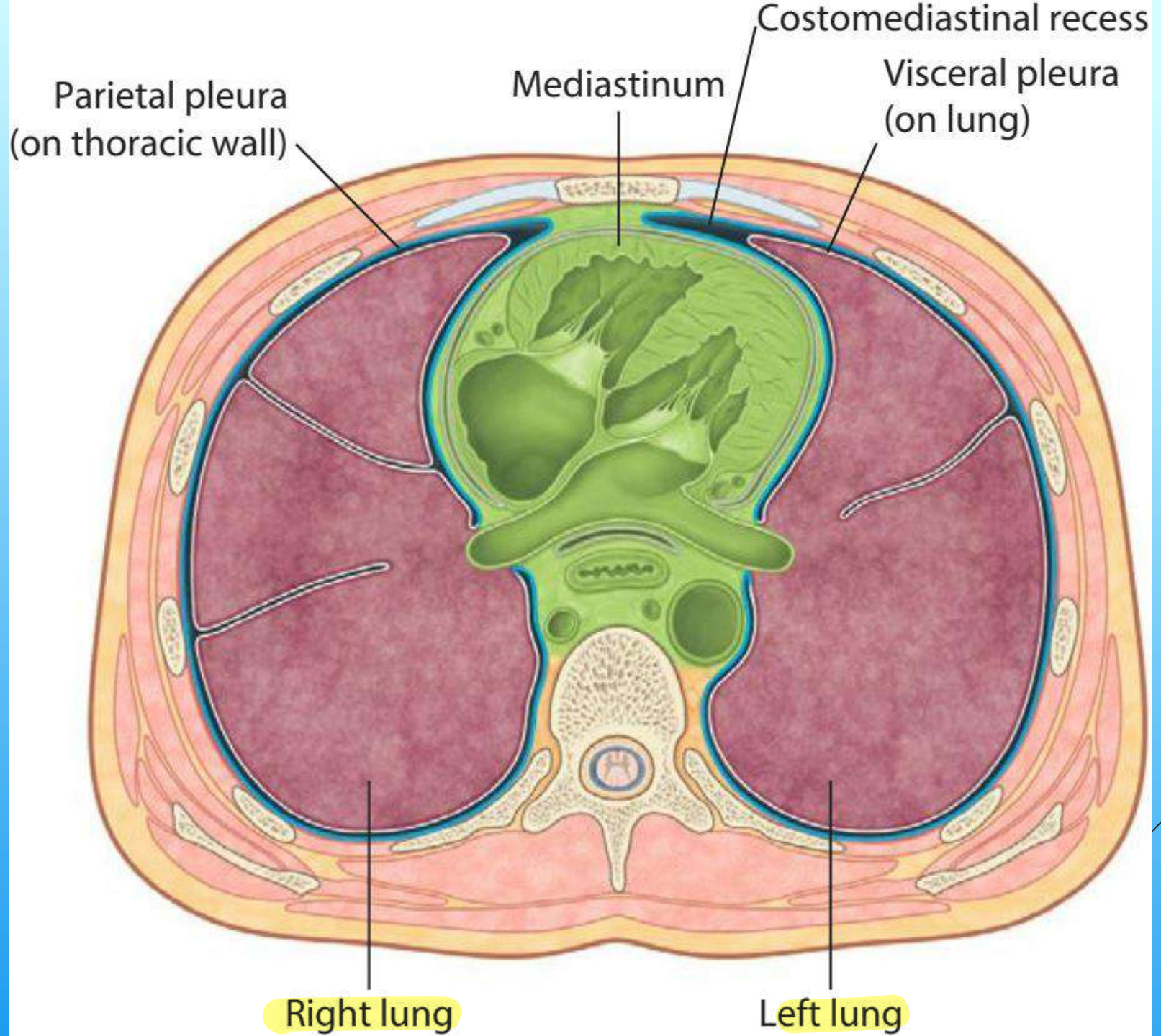


← lung و
pleural cavity



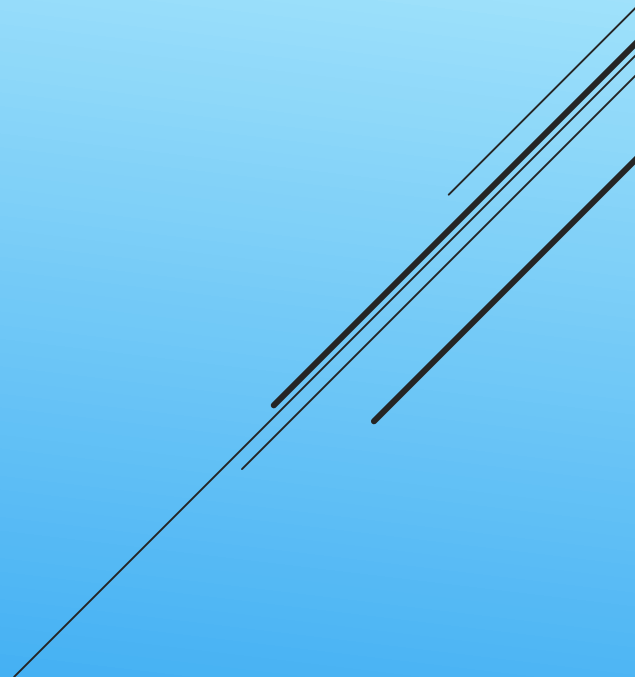
inferior
view

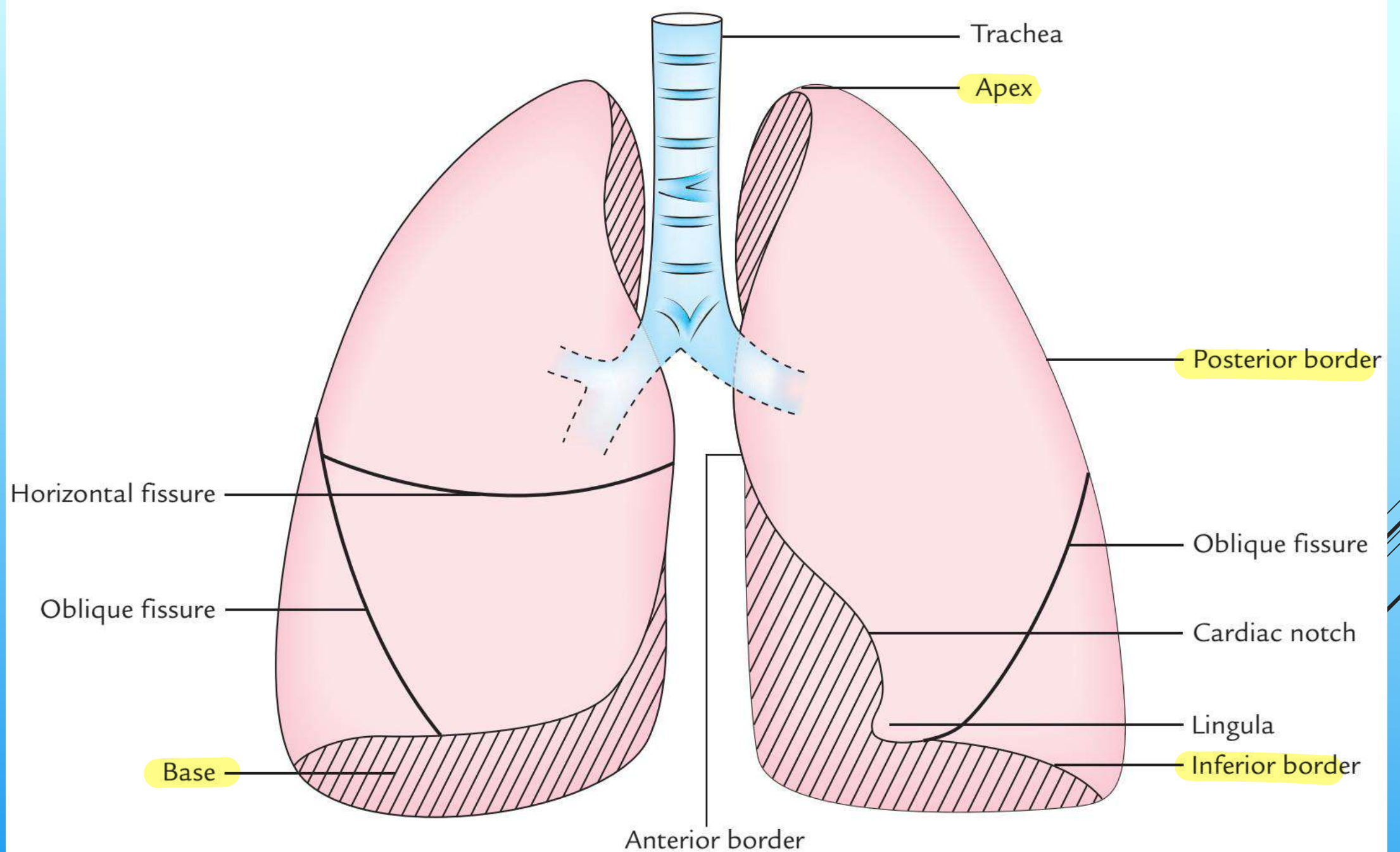
لبنوفا ب MRI
و CT



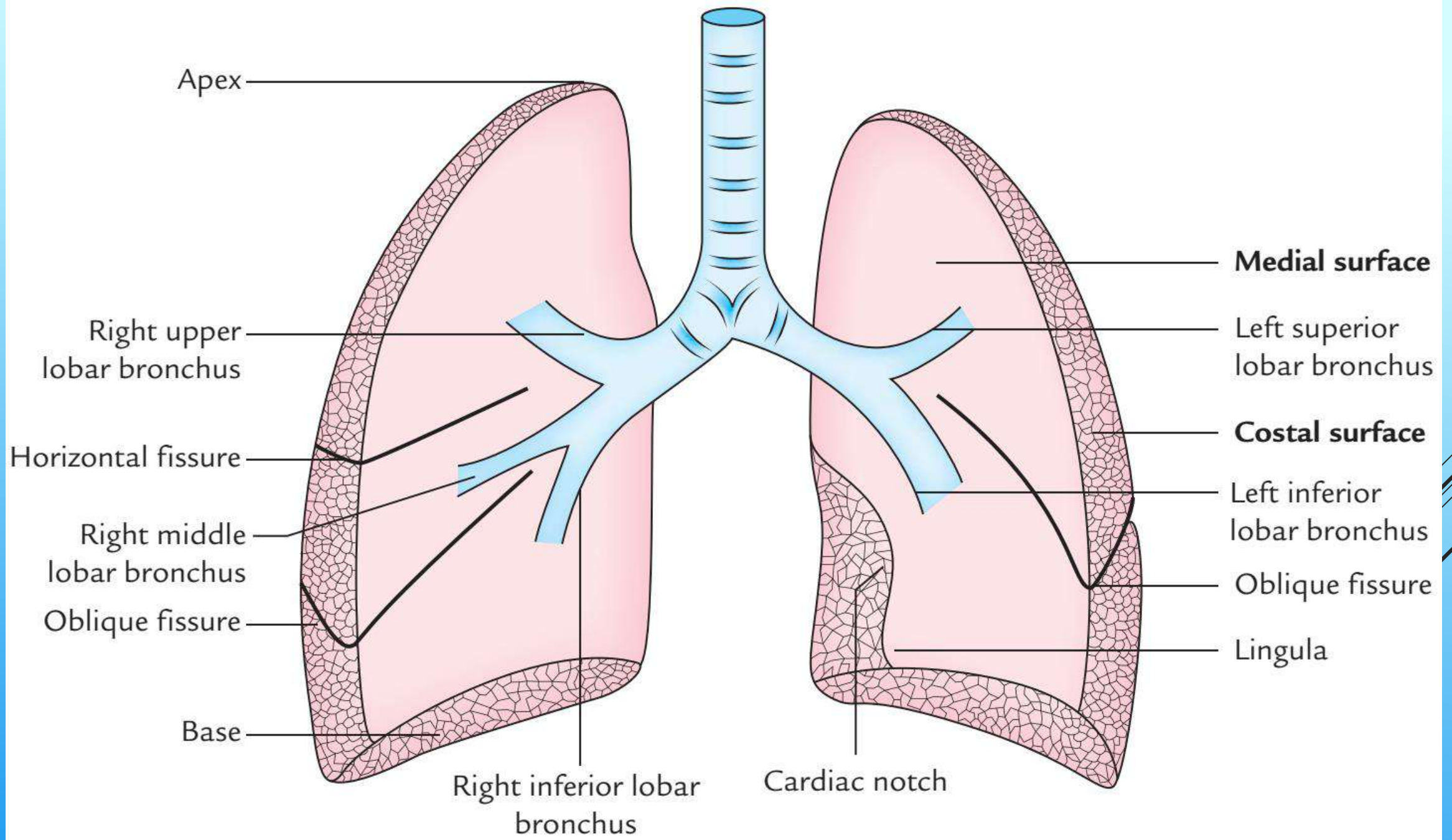
RESPIRATORY SYSTEM

The root of the lung:

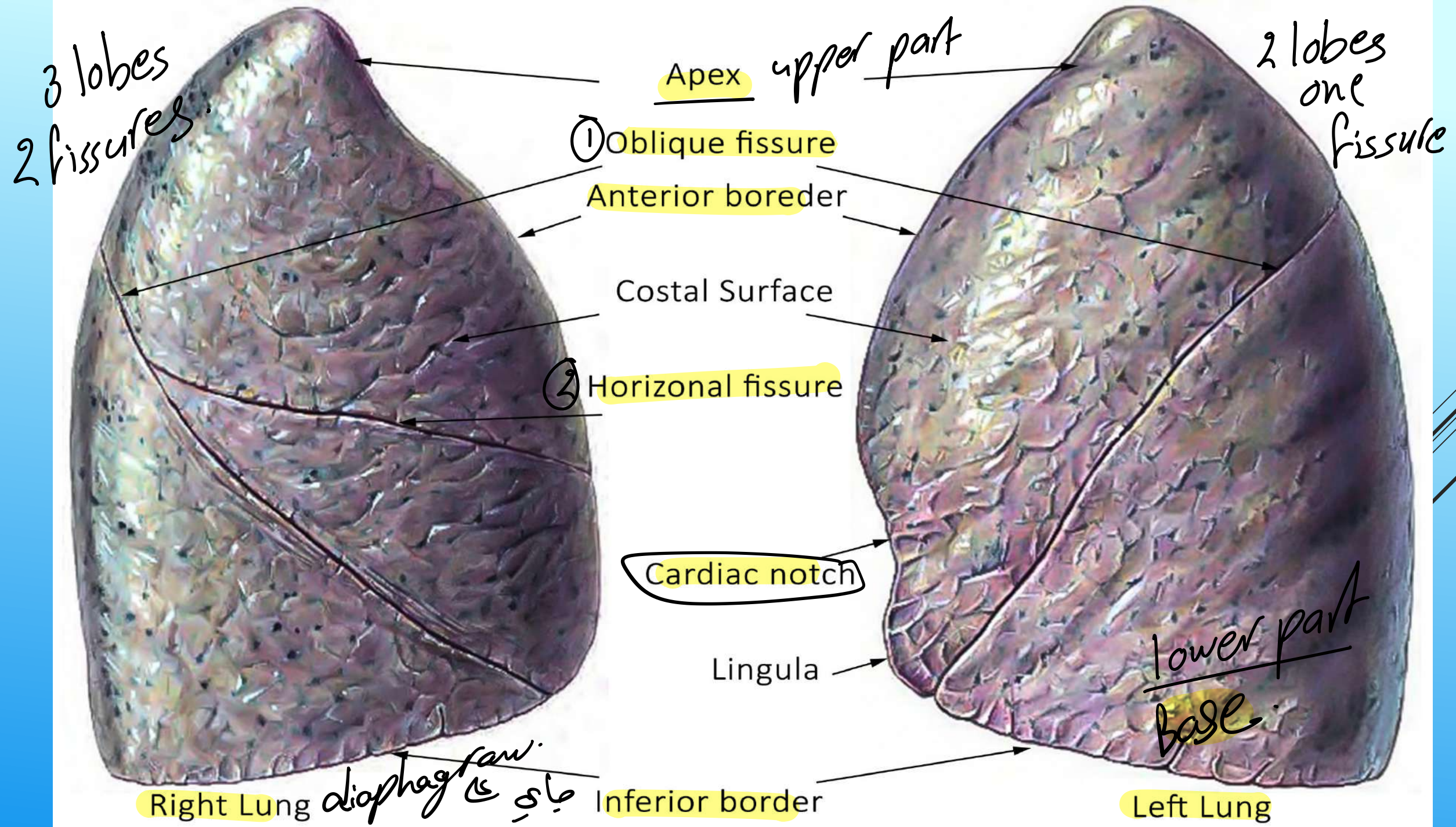
- It is a group of structures which enter or leave the lung at the hilum → *medial surface*.
 - It is made up of the following structures:
 1. **one bronchus,**
 2. **one pulmonary artery,**
 3. **two pulmonary veins,**
 4. **bronchial arteries and veins,**
 5. **lymph vessels,**
 6. **autonomic nerves.**
- 

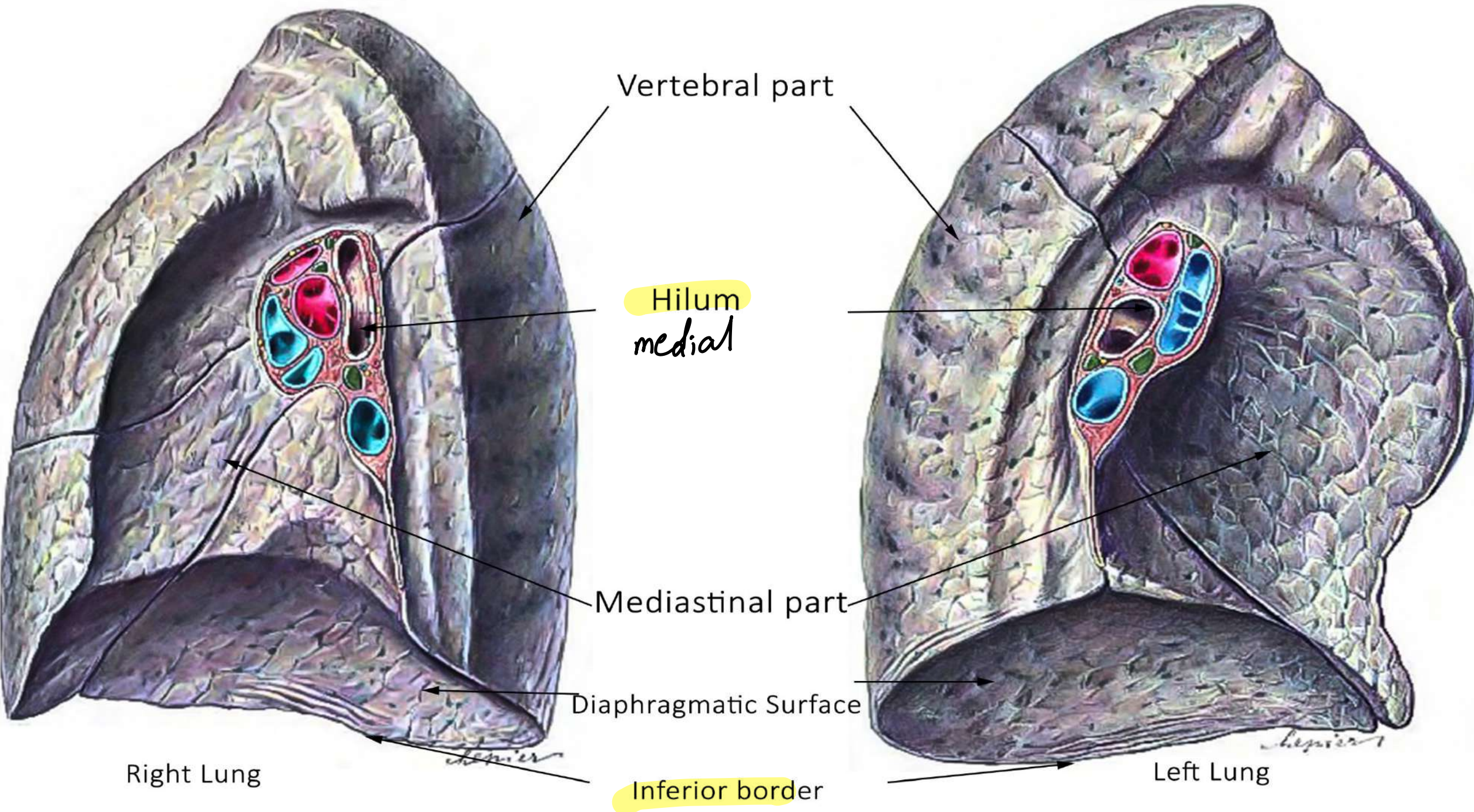


Trachea and lungs as seen from the front.



Lobes of the lung with lobar bronchi.





Vertebral part

Hilum
medial

Mediastinal part

Diaphragmatic Surface

Inferior border

Right Lung

Left Lung

RESPIRATORY SYSTEM

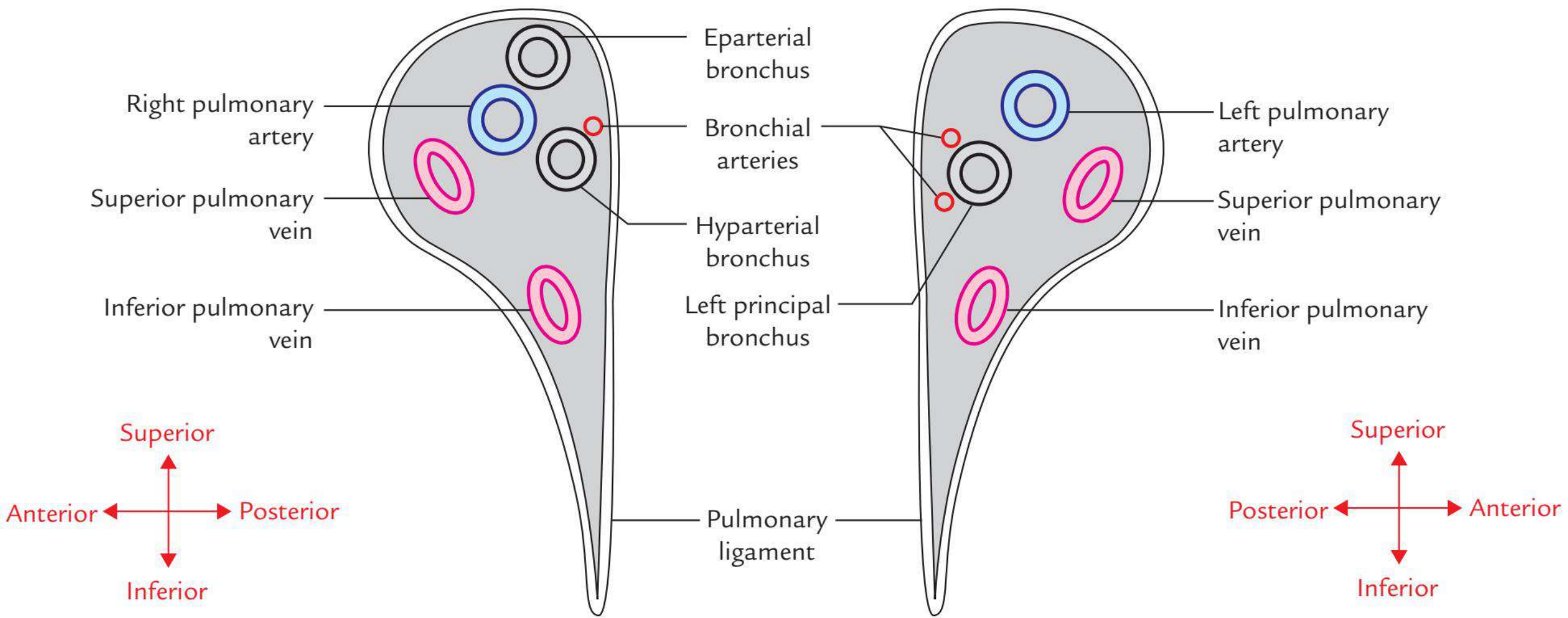
Fissures and lobes of the lung

2 fissures

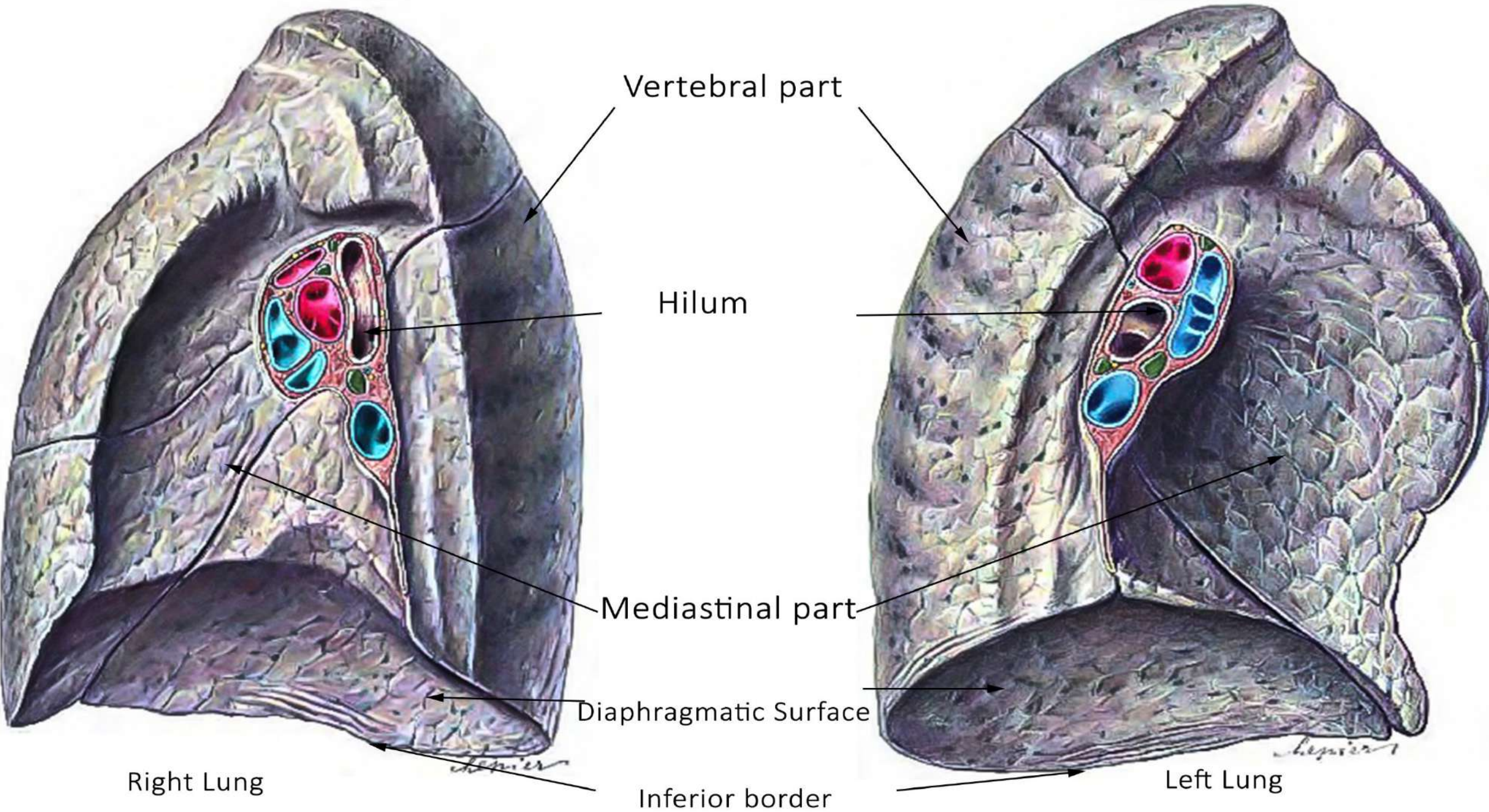
> **Right lung**: is divided into **three** lobes (**superior**, **middle** and **inferior**) by **two fissures** **oblique** and **horizontal** fissures

one fissure

> **Left Lung**: is divided into **two** lobes (**superior** and **inferior**) by only the **oblique** fissure.



Arrangement of structures in the roots of right and left lungs.



Vertebral part

Hilum

Mediastinal part

Diaphragmatic Surface

Inferior border

Right Lung

Left Lung

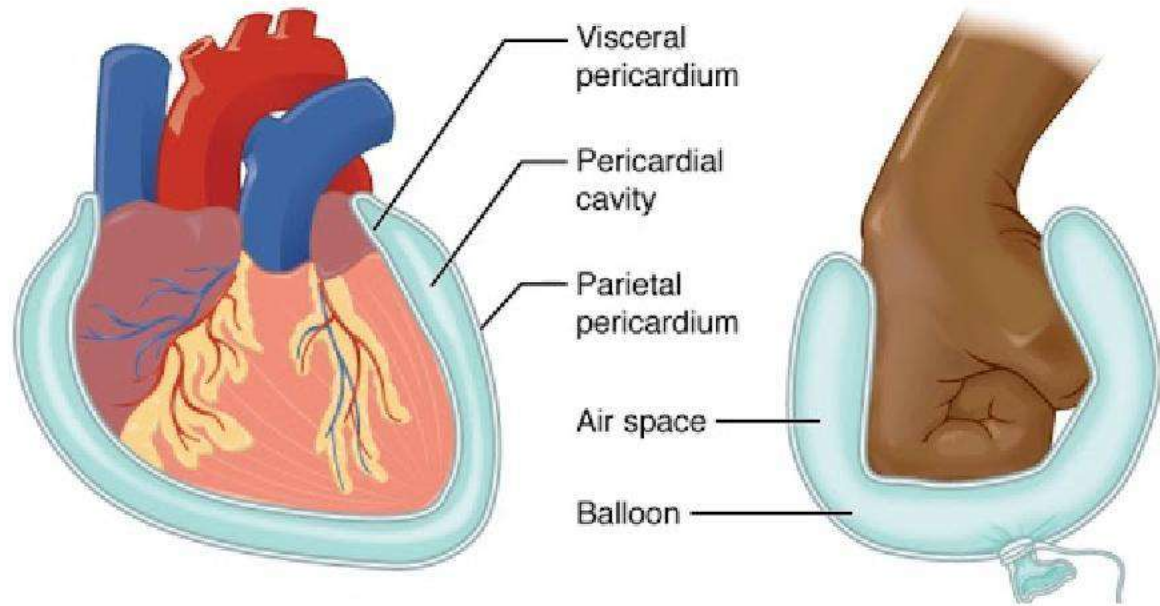
RESPIRATORY SYSTEM

The pleura

serous fluid بطح منق

- It is a closed sac of serous membrane (one for each lung) which is invaginated from its medial side by the lung, so that it has:
 - A- An outer Layer: the **parietal pleura**
 - B- An inner layer: the **visceral pleura**
- The parietal and visceral layers are separated from each other by a potential space called the **pleural cavity**. بتلون حابة
مخيرة جراً
- The two layers are **continuous** with each other around the **hilum** of the lung.

Serous Membranes



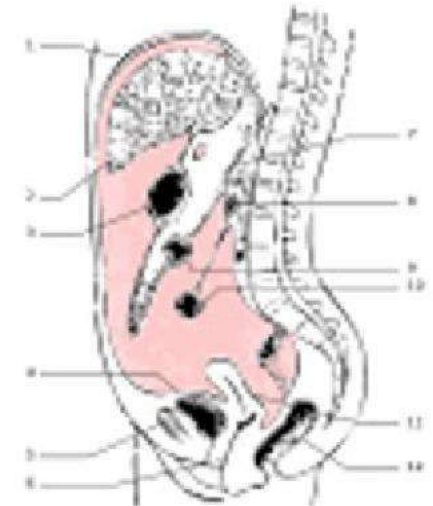
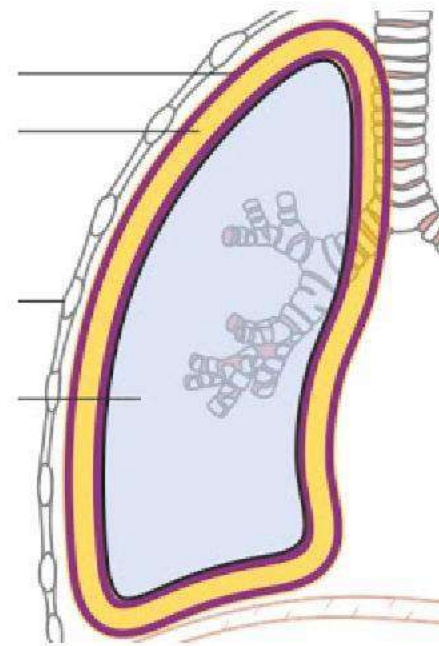
Serous Membrane - covers walls and organs in the thoracic and abdominopelvic cavities.

Parietal Layer - line the walls of the body cavity **Visceral layer** - covers the organs (the viscera).

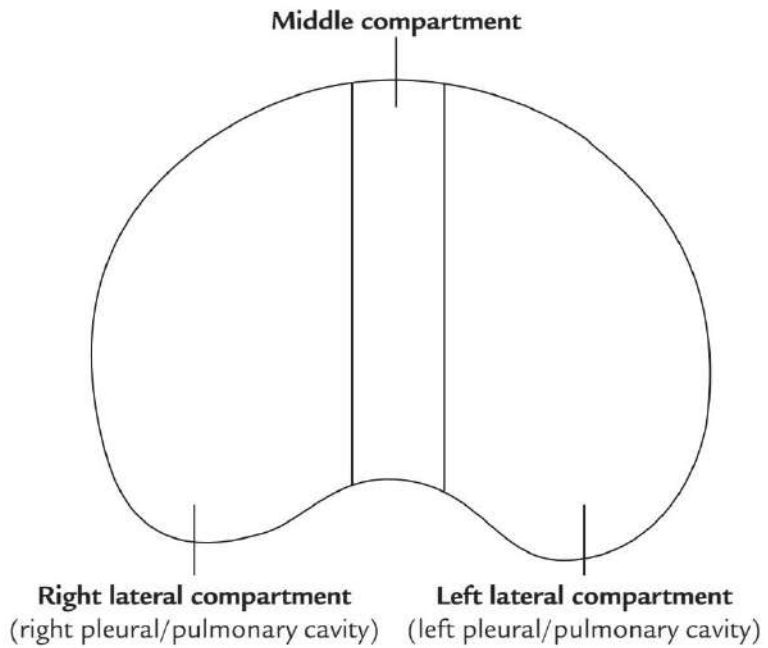
Serous Space/Fluid - Between the parietal and visceral layers. *To prevent friction*

3 Serous Membranes:

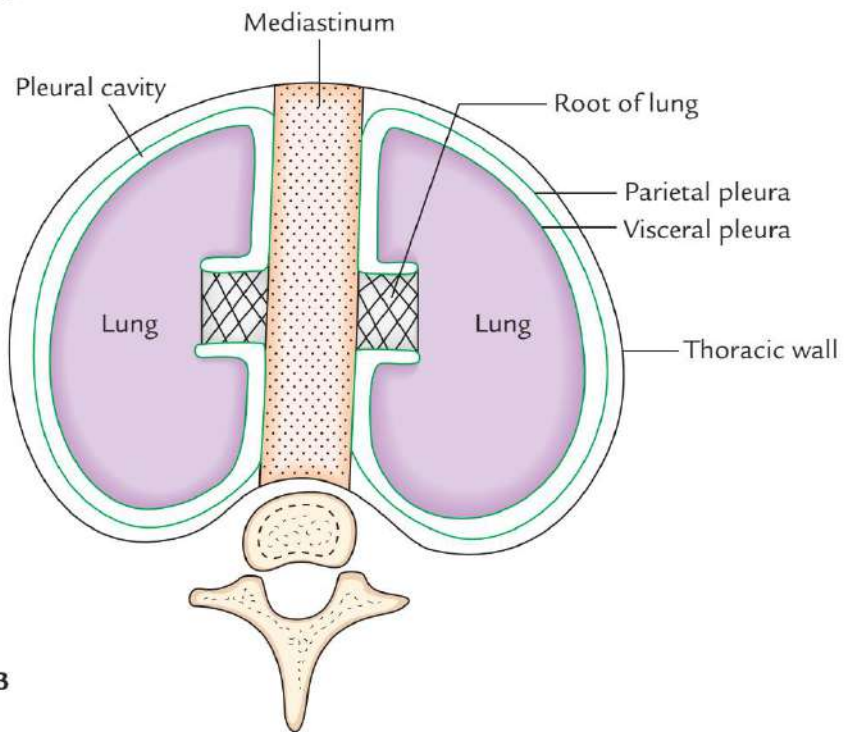
1. **Pleura** – Serous Membrane that surrounds the lungs. One for each lung.
2. **Pericardium** – Serous Membrane that surrounds the heart.
3. **Peritoneum** – Serous membrane that surrounds several organs in the abdominopelvic cavity.



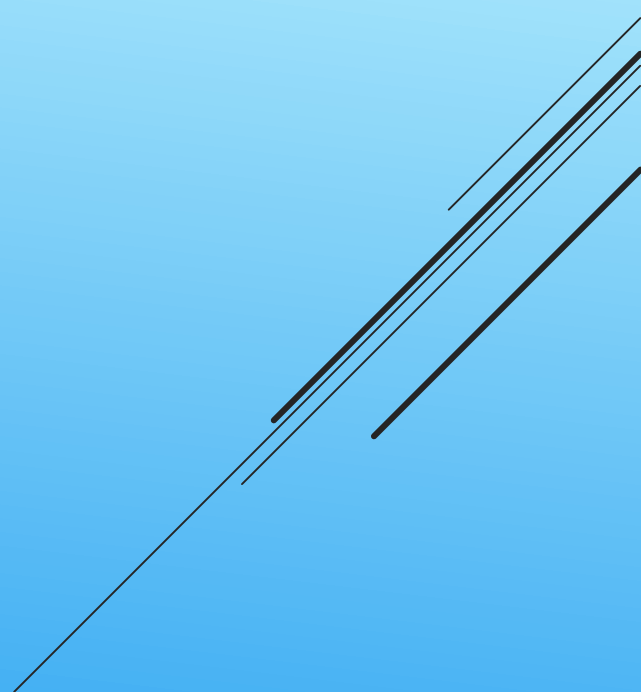
pleural cavity
↓
lungs or both sides of the

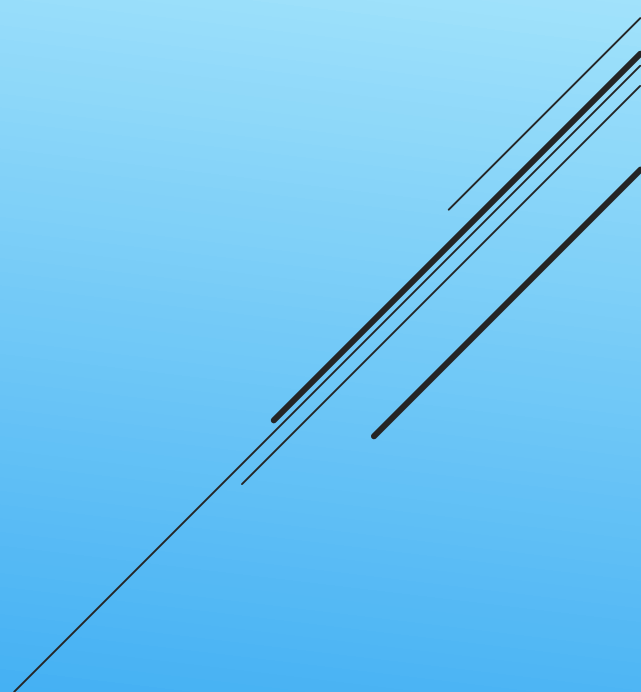
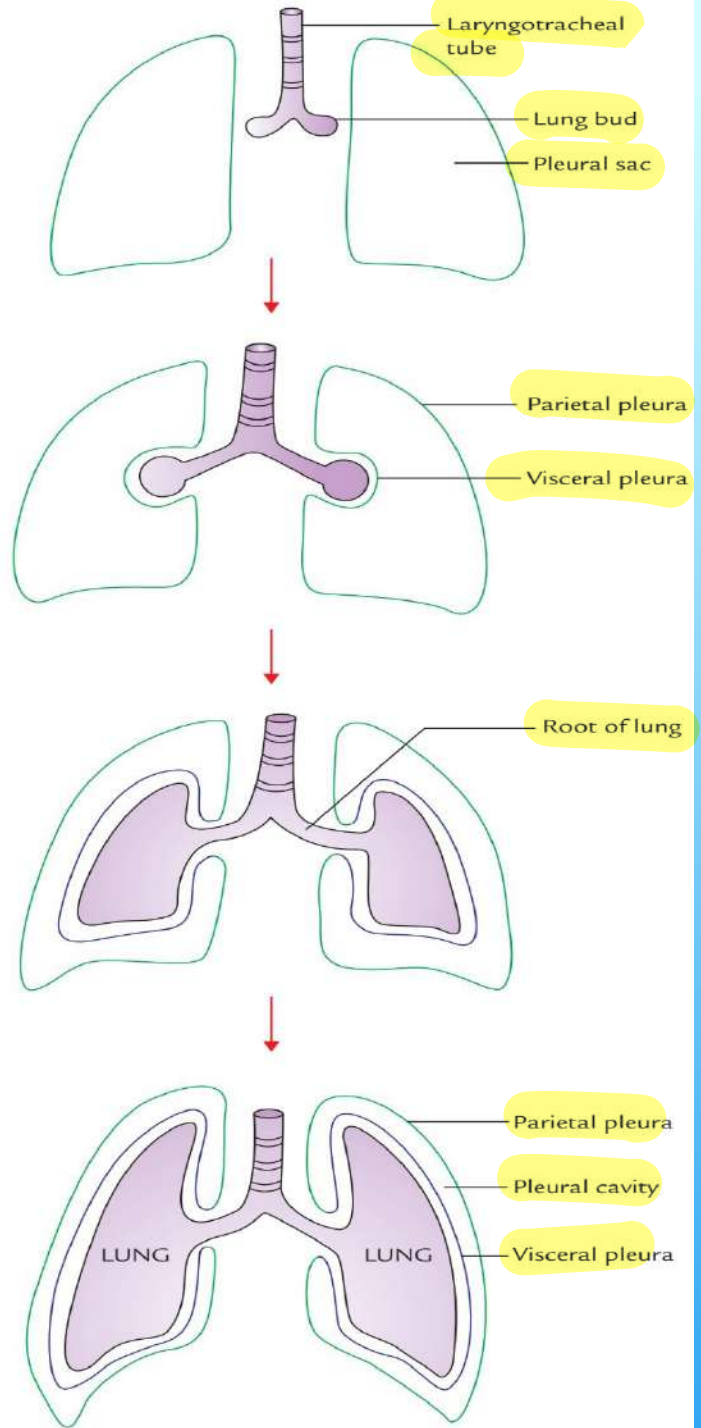


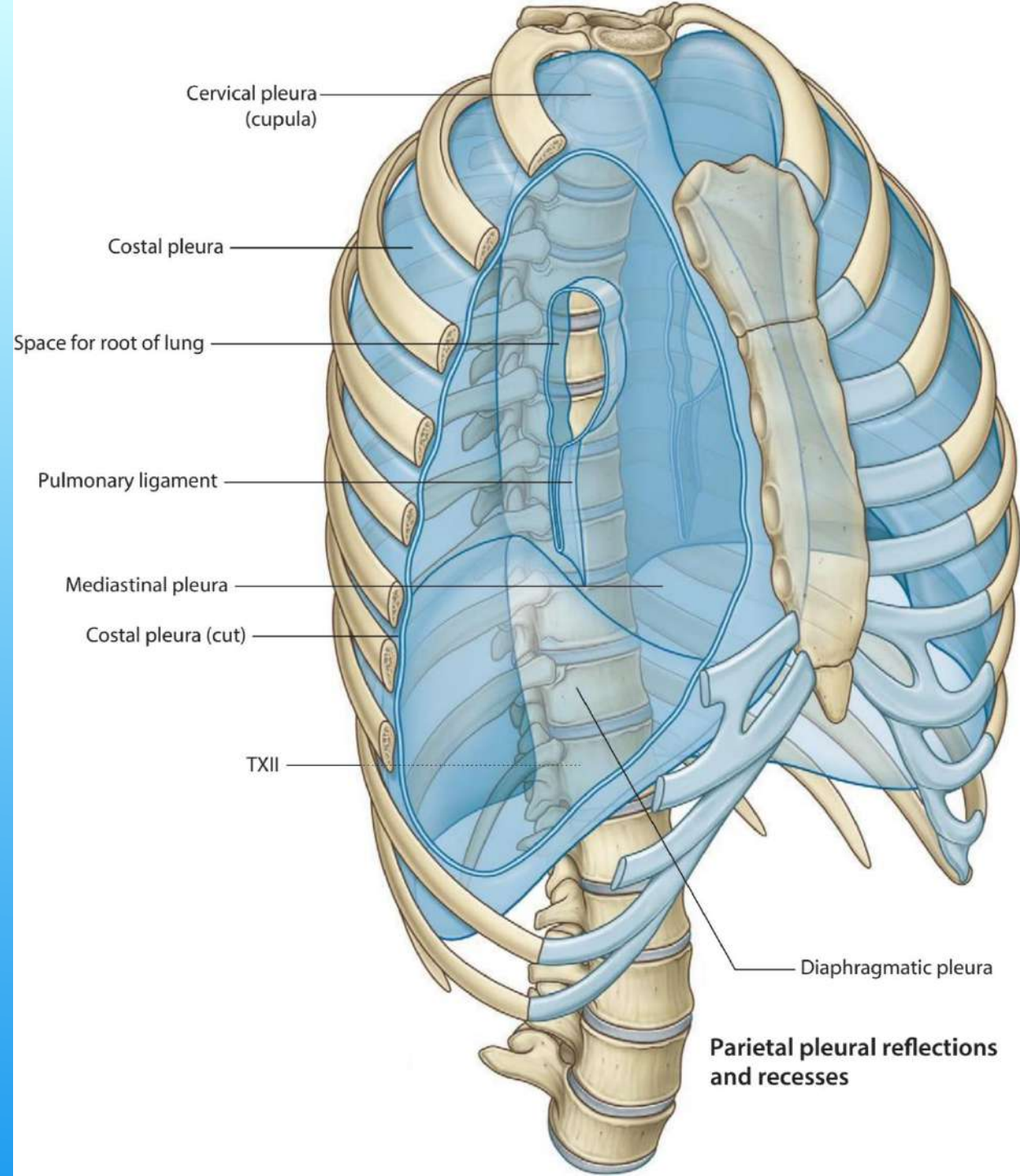
A

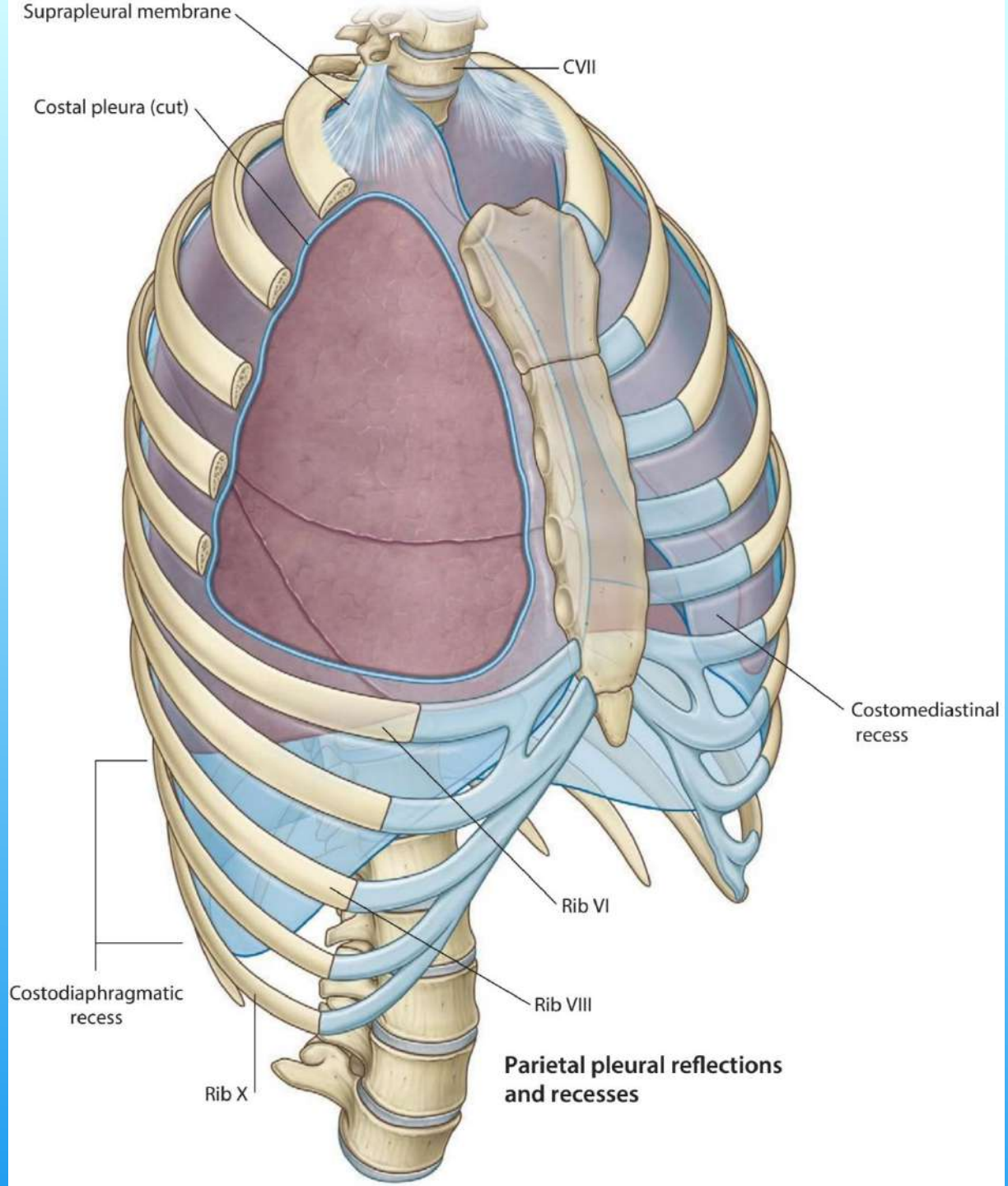


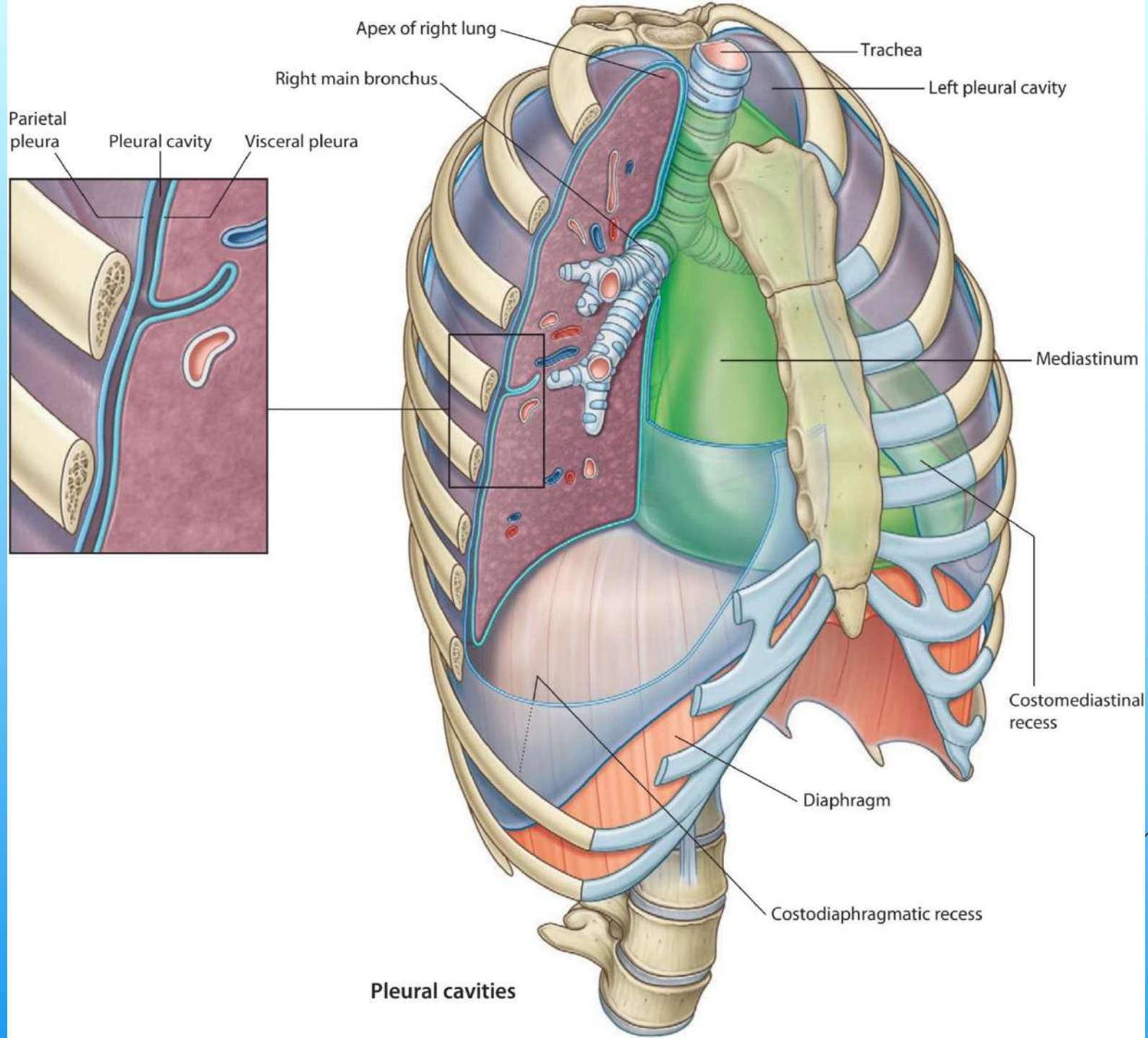
B



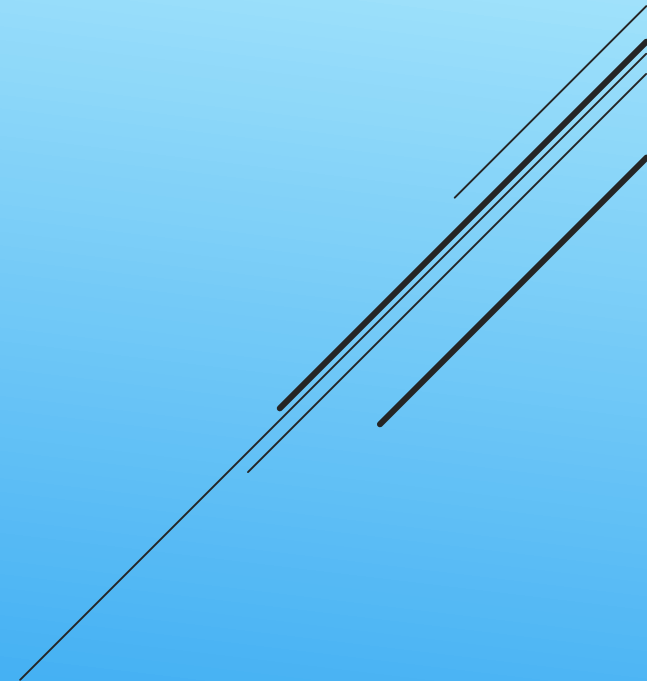








شکرا



RESPIRATORY SYSTEM

