Respiratory system practical

By

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Ass. Prof. OF Anatomy

Anatomy Lab 1:

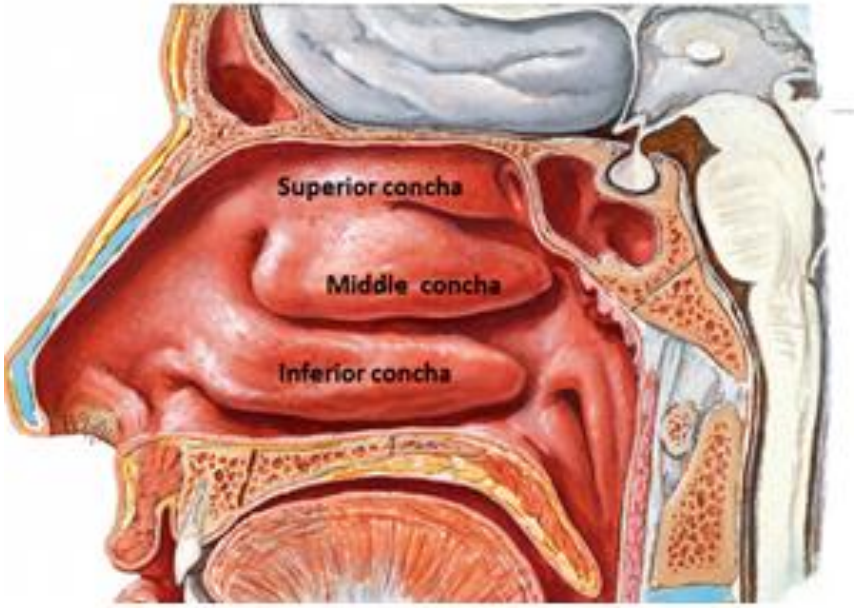
*Nose & paranasal sinuses

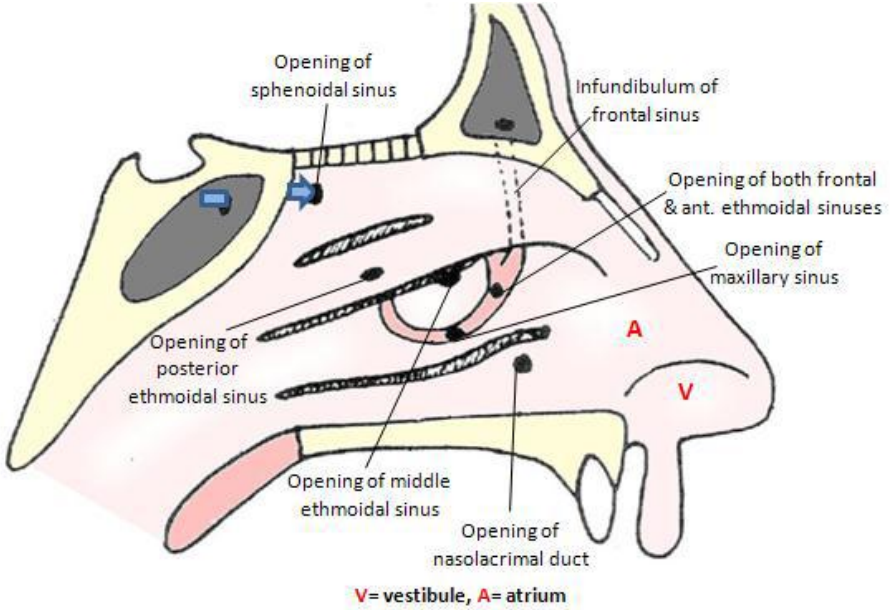
*Larynx

*Pharynx

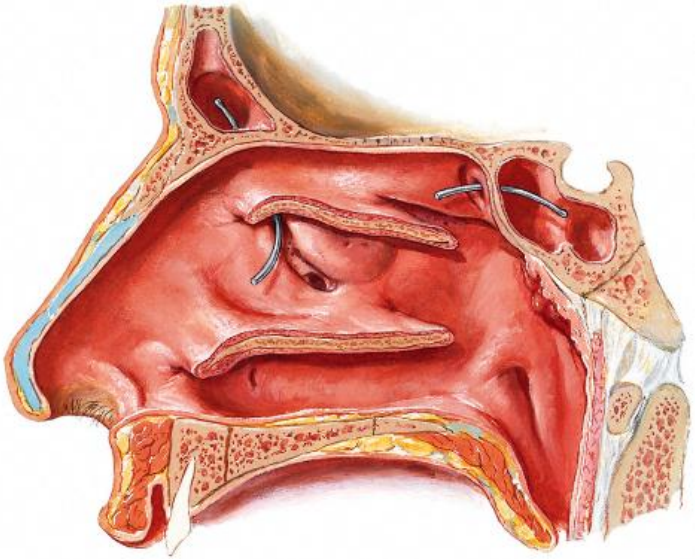
*Trachea

*Bronchi





V= vestibule, A= atrium



- **Lat. wall presents:**

1- Sup. Concha.

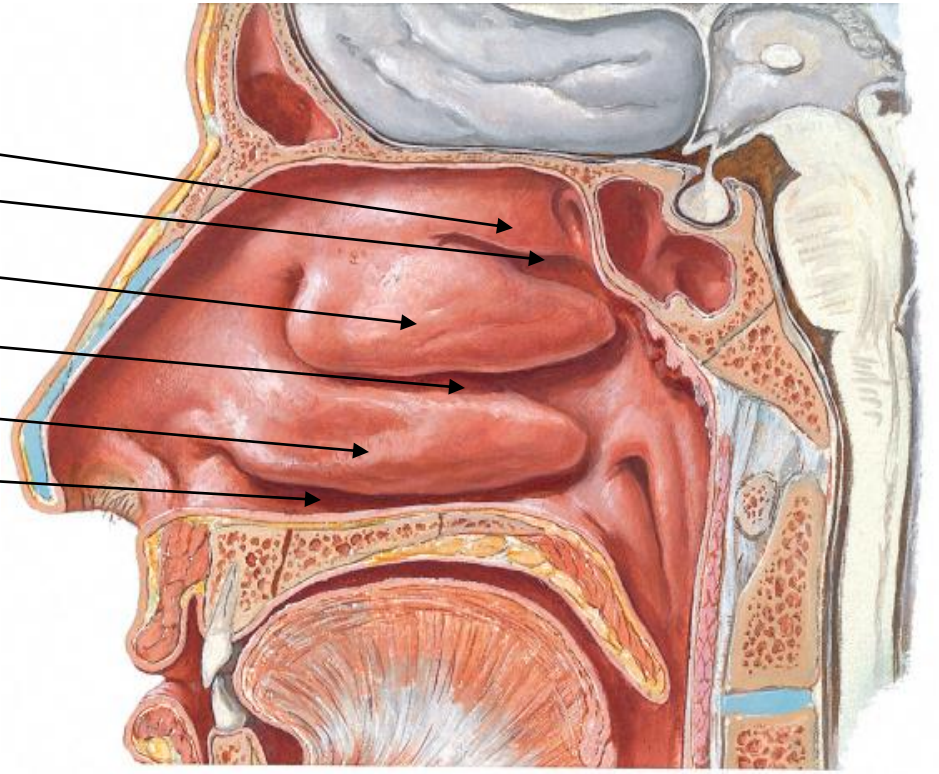
2- Sup. Meatus.

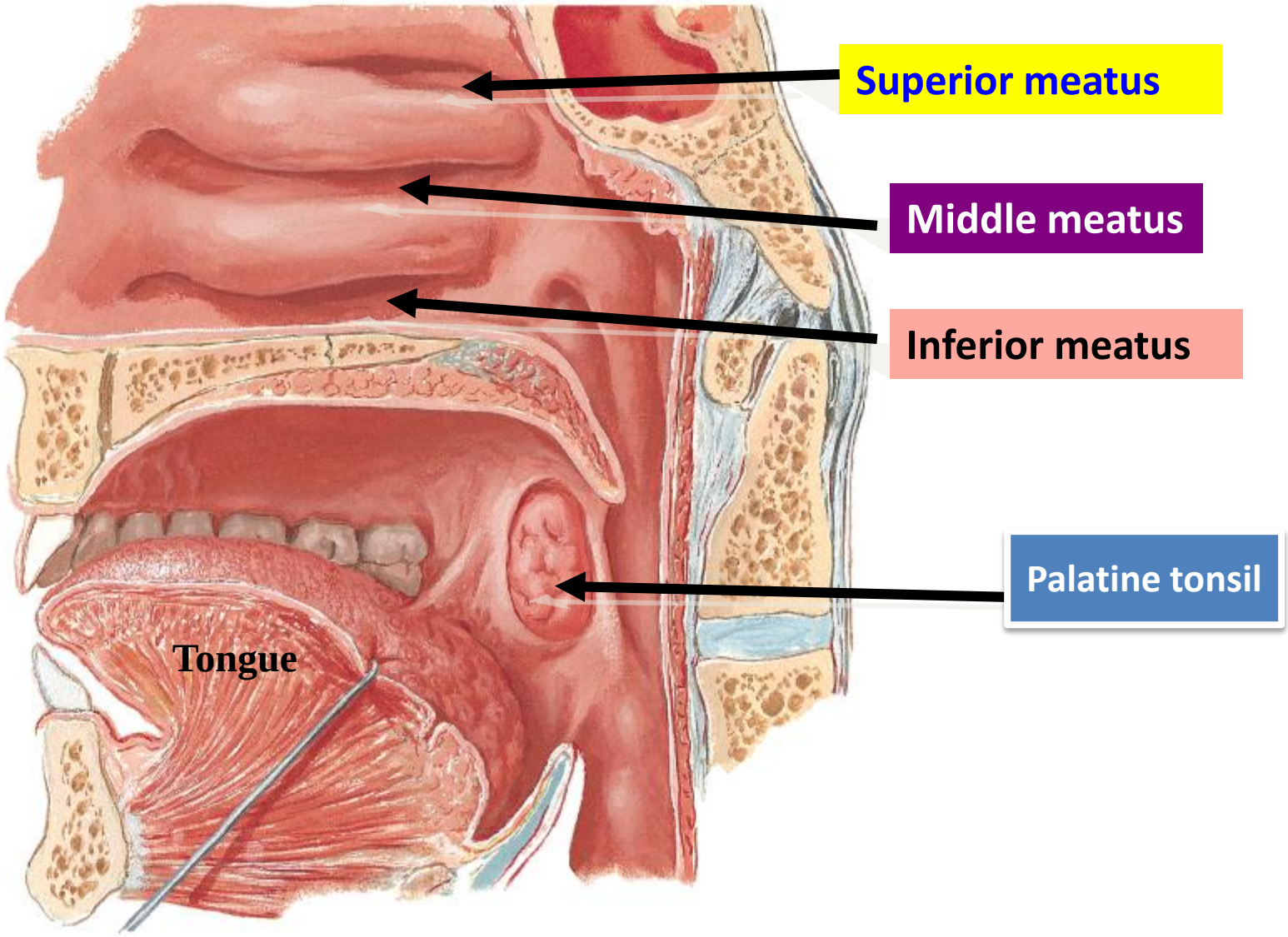
3- Middle concha.

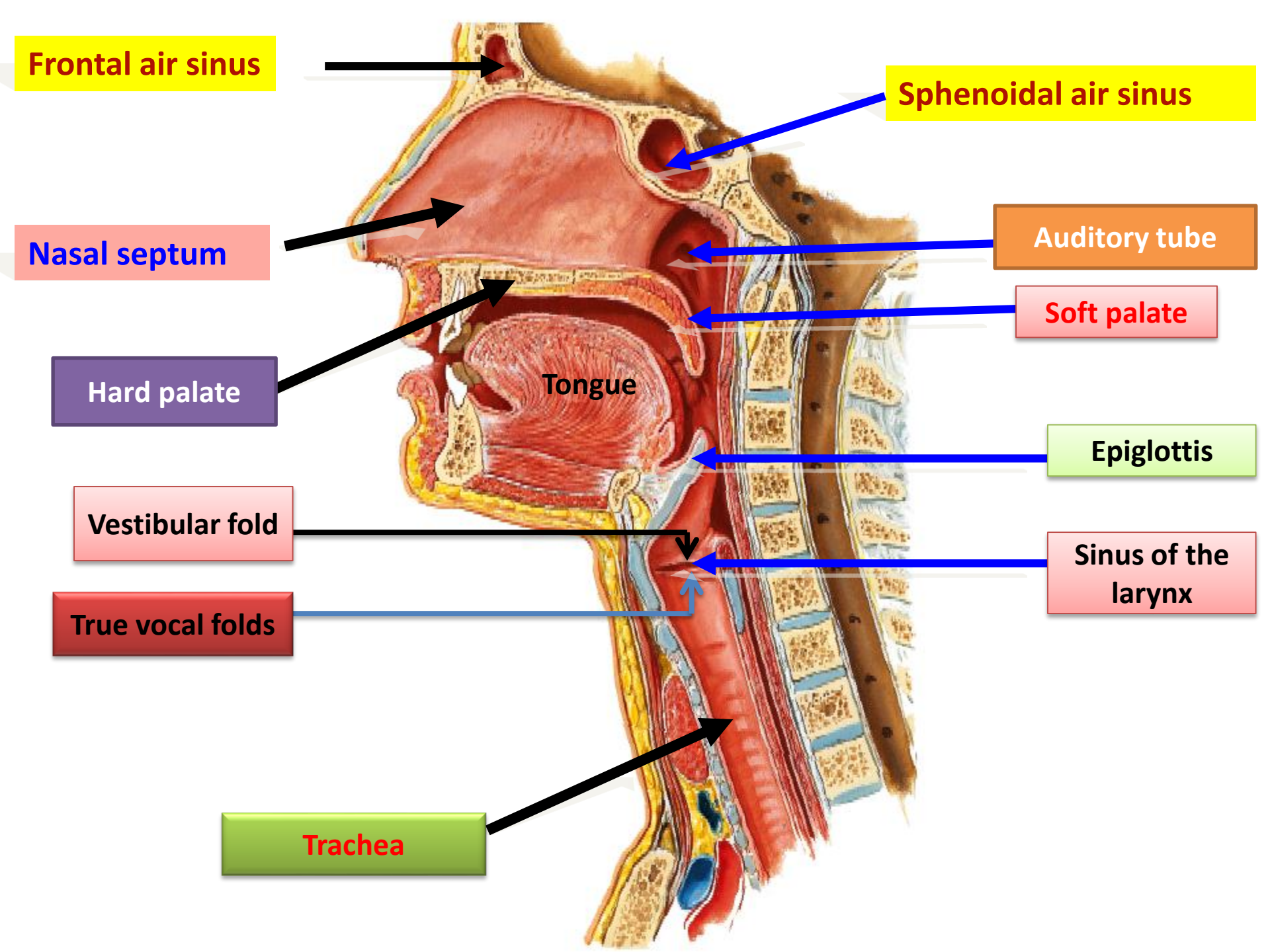
4- Middle meatus.

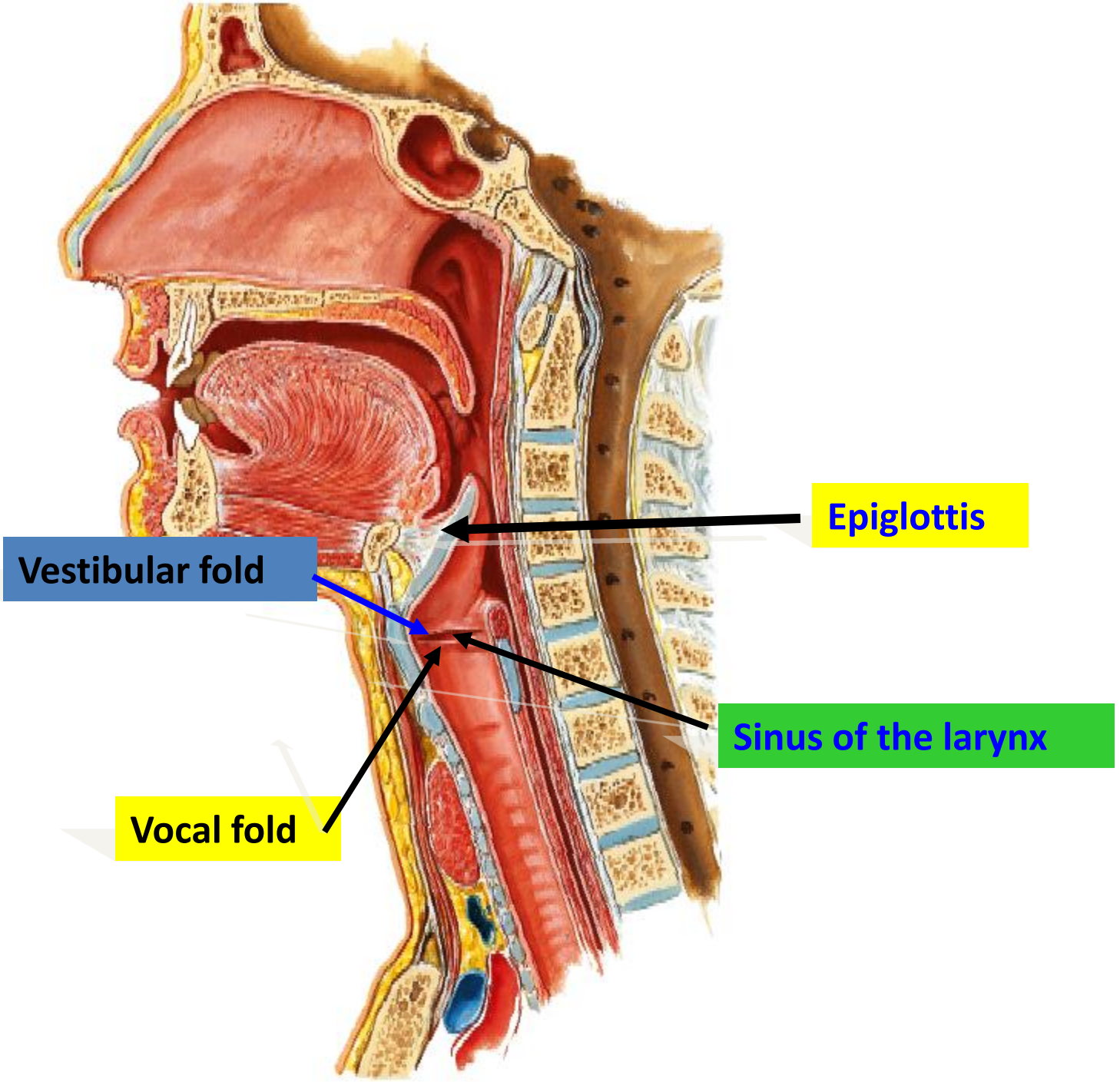
5- Inf. Concha.

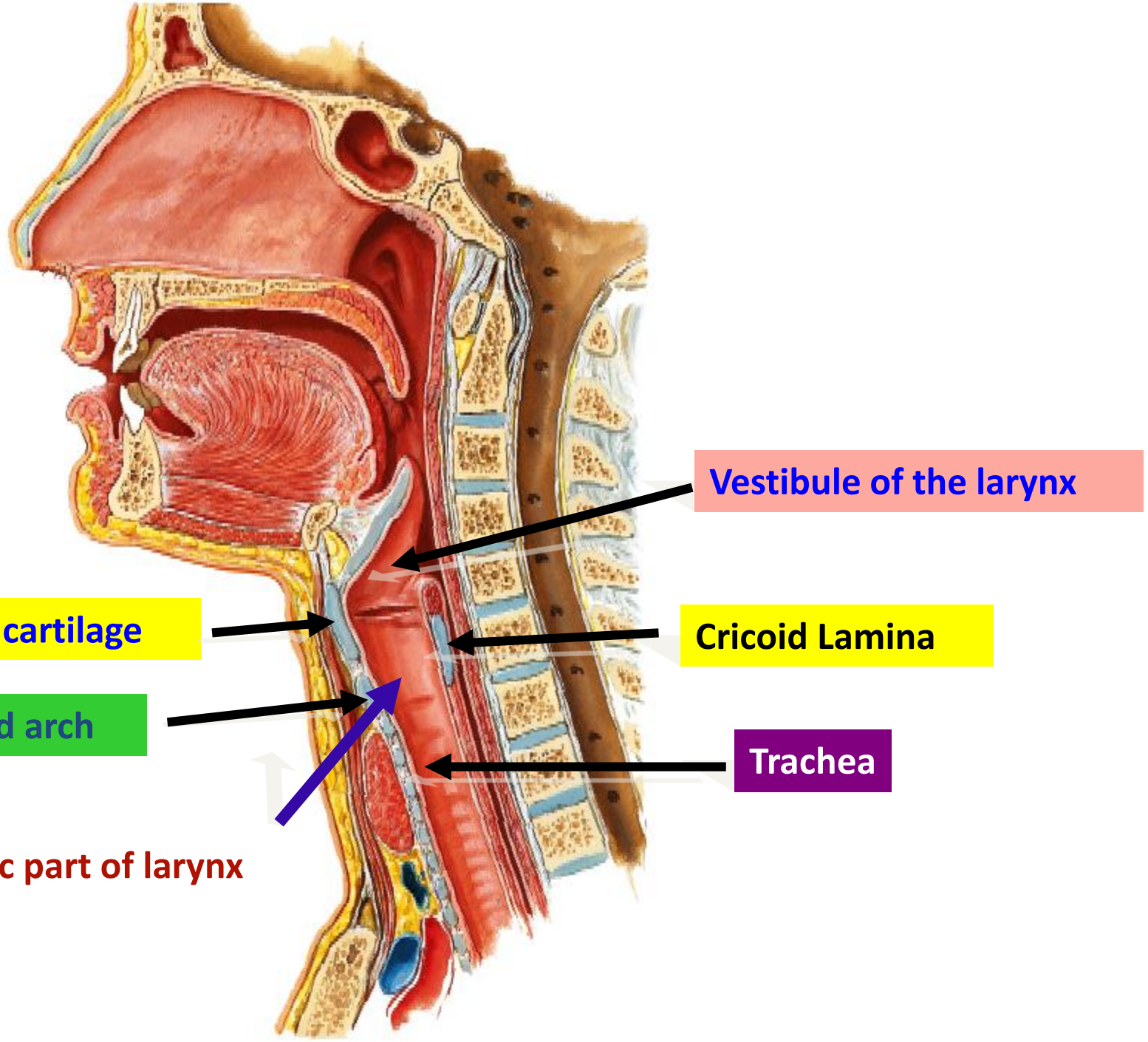
6- Inf. Meatus.

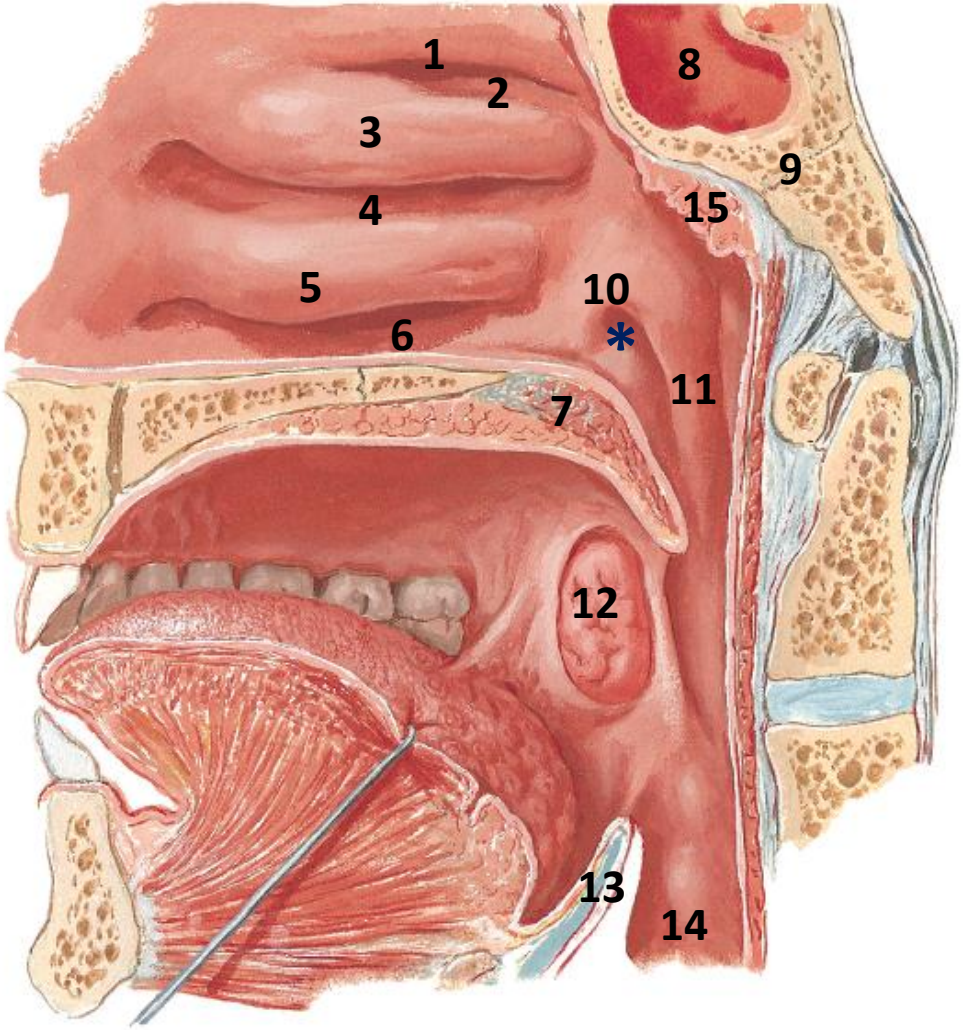



Superior meatus
Middle meatus
Inferior meatus
Palatine tonsil
Tongue


Frontal air sinus
Sphenoidal air sinus
Nasal septum
Auditory tube
Soft palate
Hard palate
Tongue
Epiglottis
Vestibular fold
Sinus of the larynx
True vocal folds
Trachea

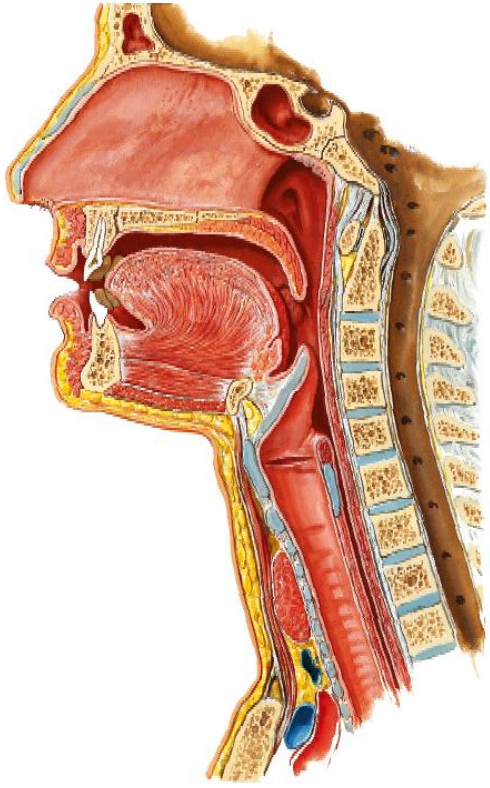

Epiglottis
Vestibular fold
Sinus of the larynx
Vocal fold

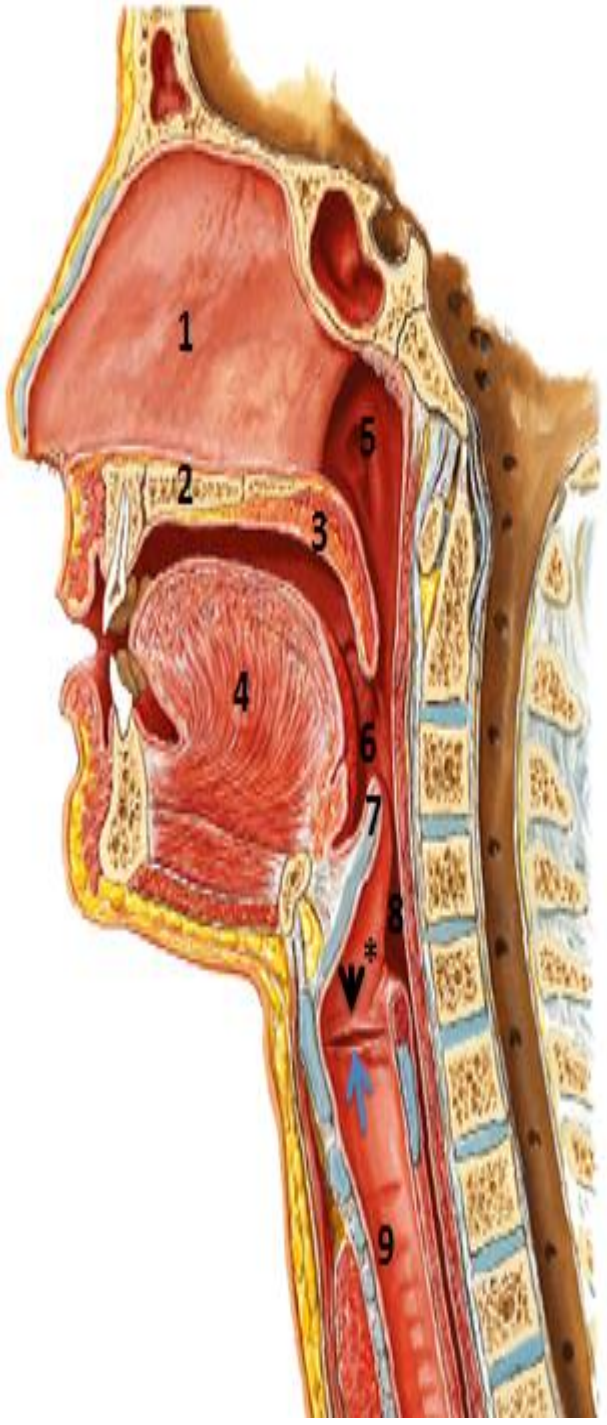

Vestibule of the larynx
Thyroid cartilage
Cricoid Lamina
Cricoid arch
Trachea
Infraglottic part of larynx



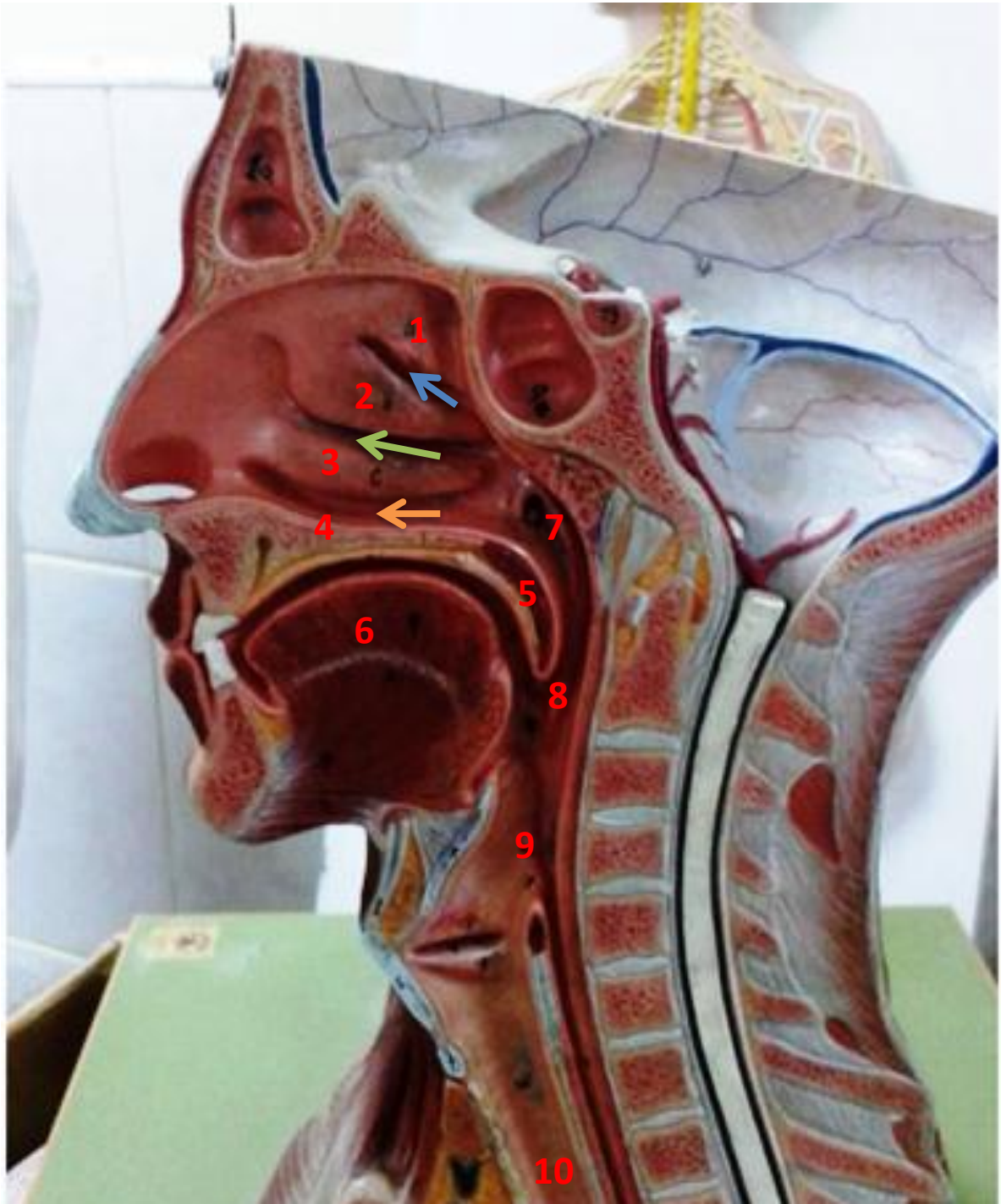
1- superior concha
2- superior meatus
3- middle concha
4- middle meatus
5- inferior concha
6-inferior meatus
7-soft palate
8-sphenoid air sinus
9-body of sphenoid
10-tubal elevation
*pharyngeal opening of auditory tube
11-salpingopharyngeal fold
12-palatine tonsil
13-epiglottis
14- laryngeopharynx
15-nasopharyngeal tonsil

1-nasal septum
2-hard palate
3- soft palate
4-tongue
5-nasopharnx
6-oropharnx
contains
Palatine tonsils
7-Epiglotis
8-laryngopharnx
9-trachea
*= laryngeal inlet (laryngeal cavity)
Black arrow:
vestibular fold
Blue arrow:
true vocal folds

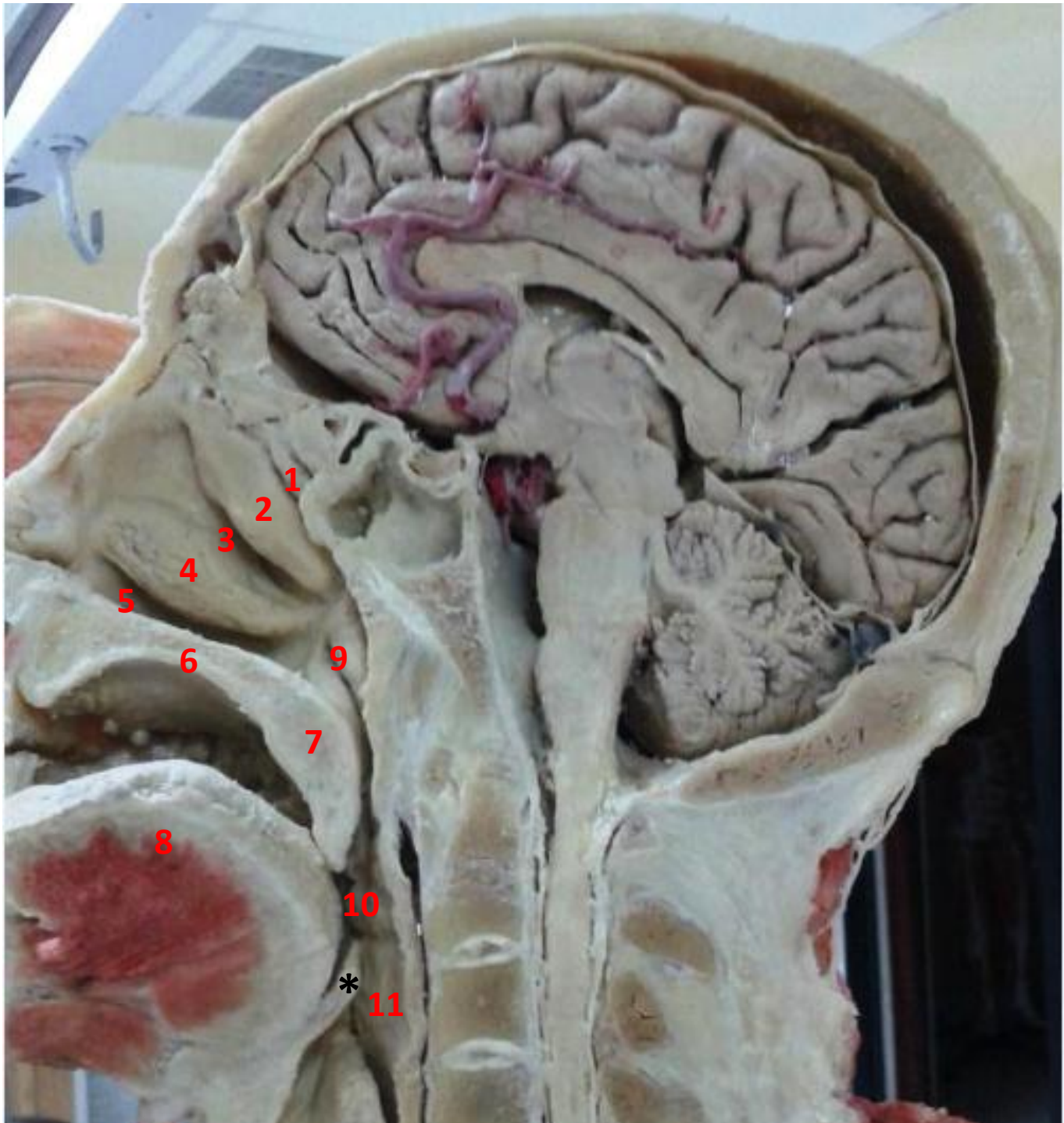


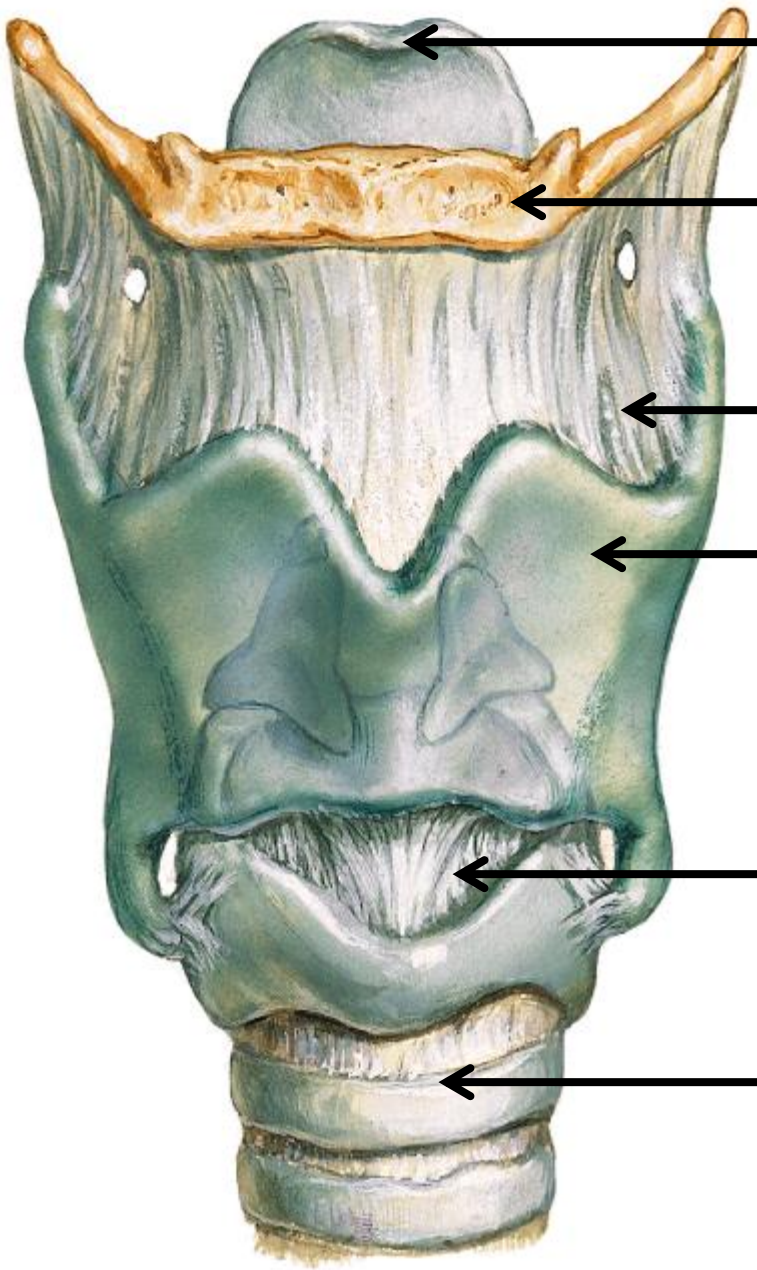


1- superior concha
2-middle concha
3-inferior concha
Blue Arrow: superior meatus
Green Arrow: middle meatus
Orange Arrow: inferior meatus
4- hard palate
5- soft palate
6- tongue
7-nasopharnx
8-oropharnx
9-laryngeal inlet
10-trachea

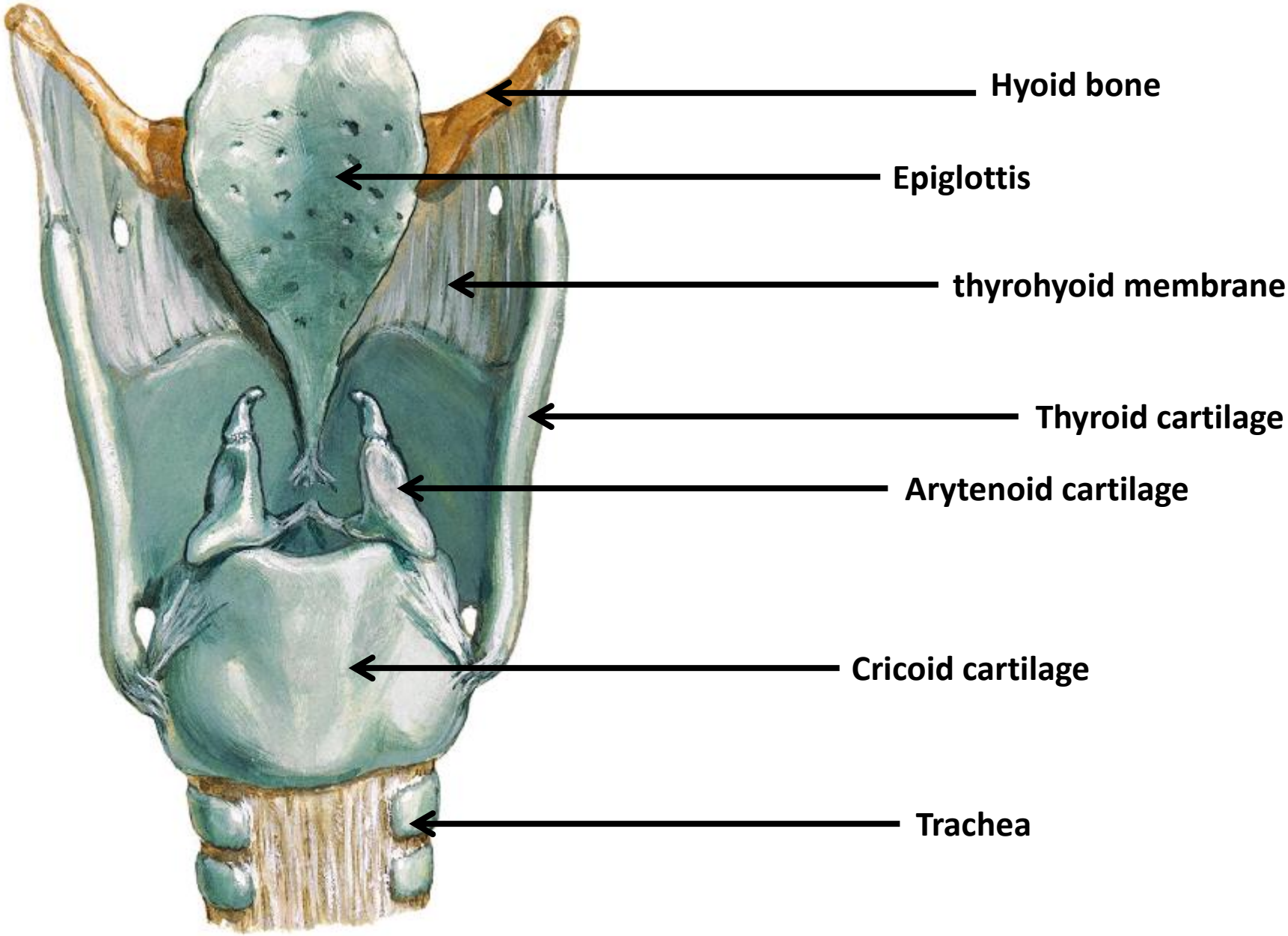


1-superior concha
2-middle concha
3- middle meatus
4-inferior concha
5-inferior meatus
6-hard palate
7-soft palate
8-tongue
9-nasopharynx
10-oropharynx
11-laryngopharynx
*= epiglottis

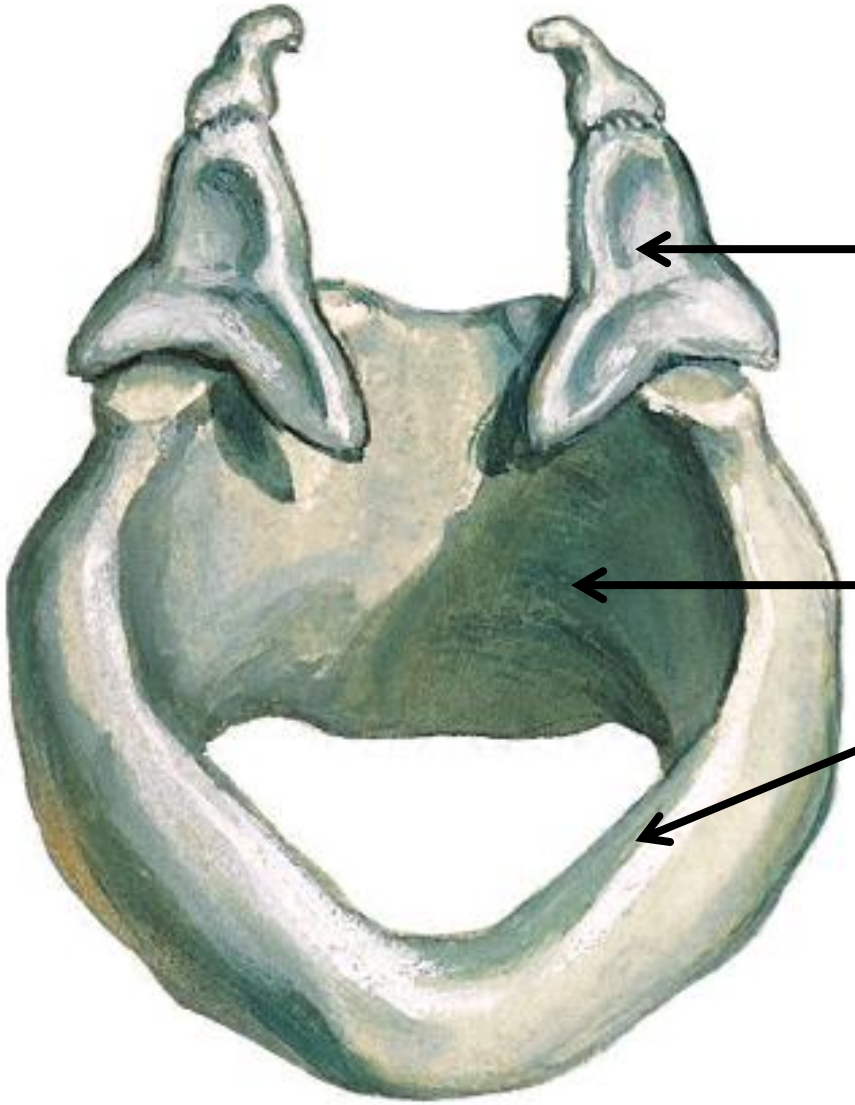




Anterior view larynx and trachea

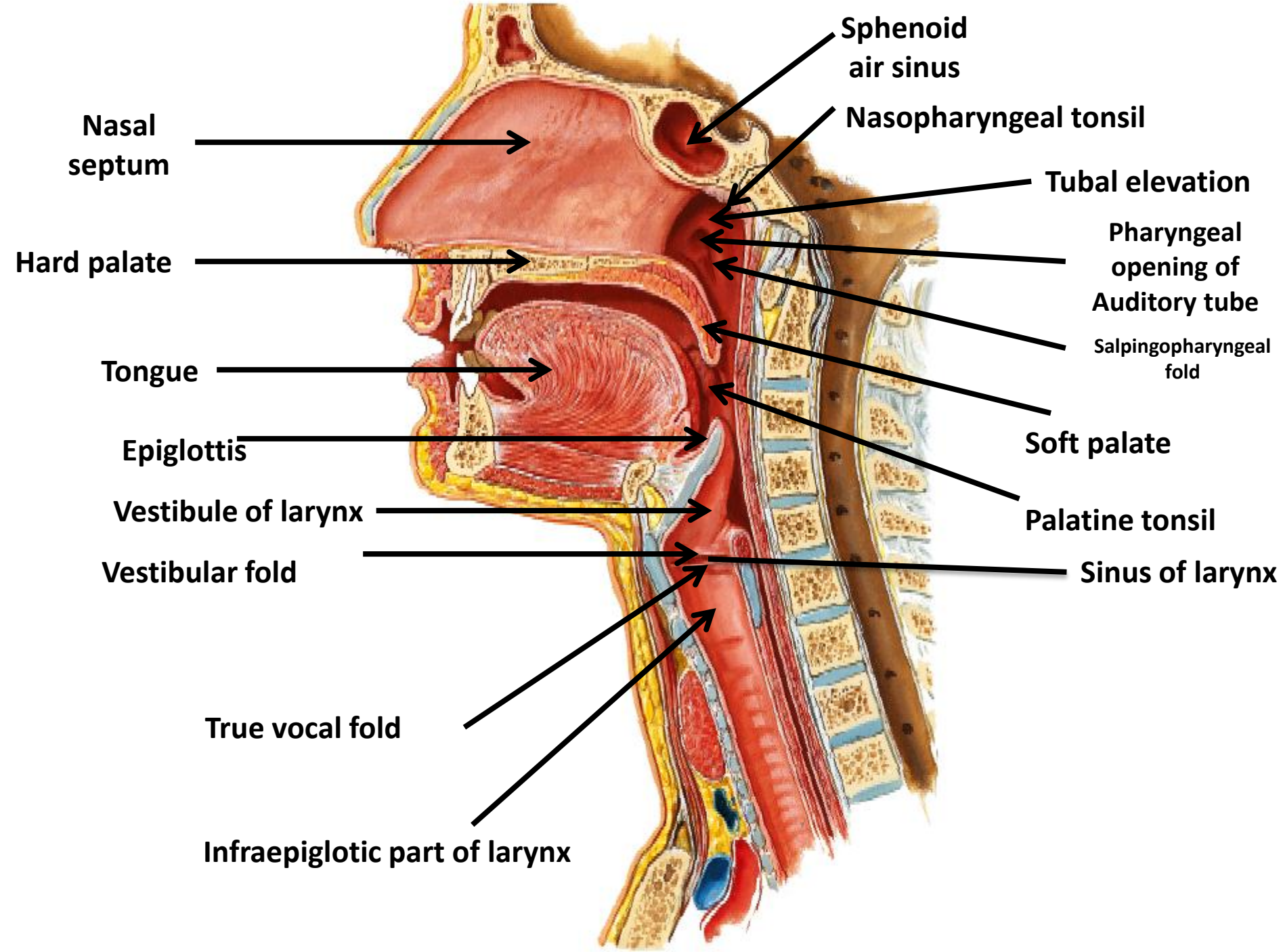


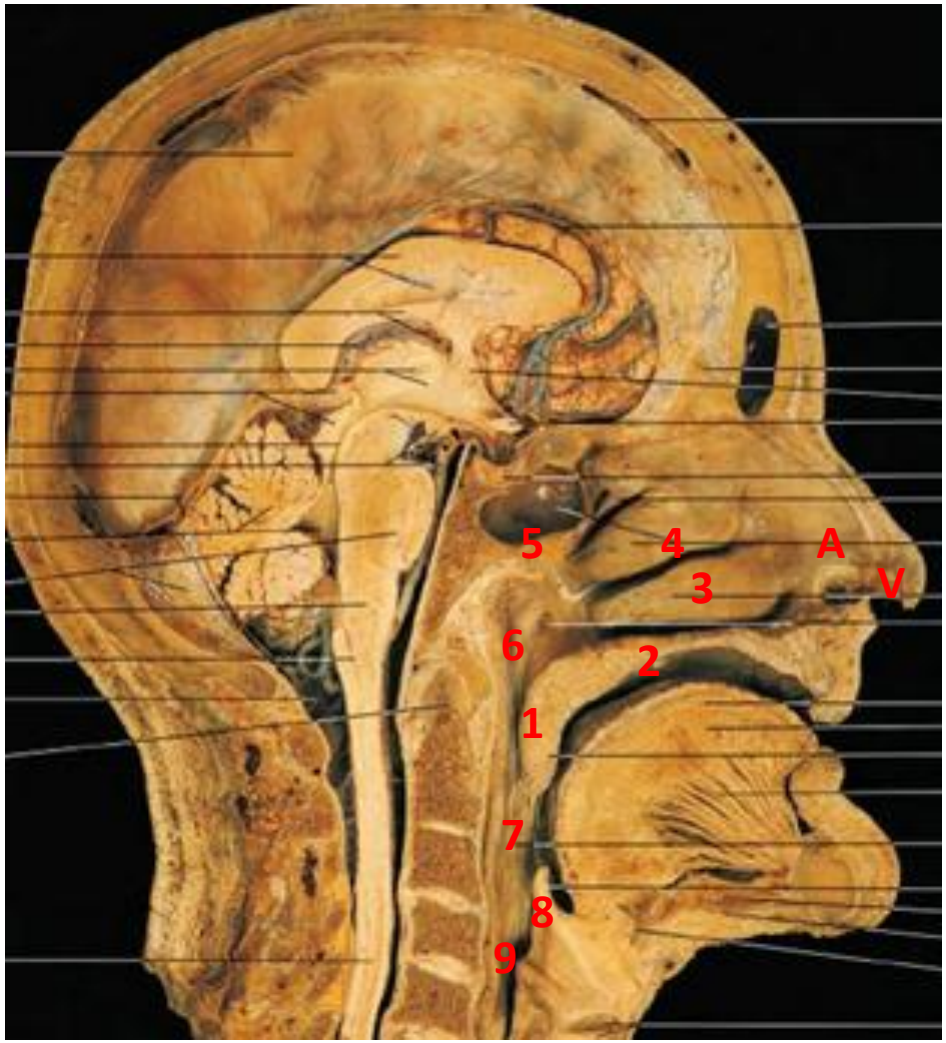
Posterior view larynx and trachea



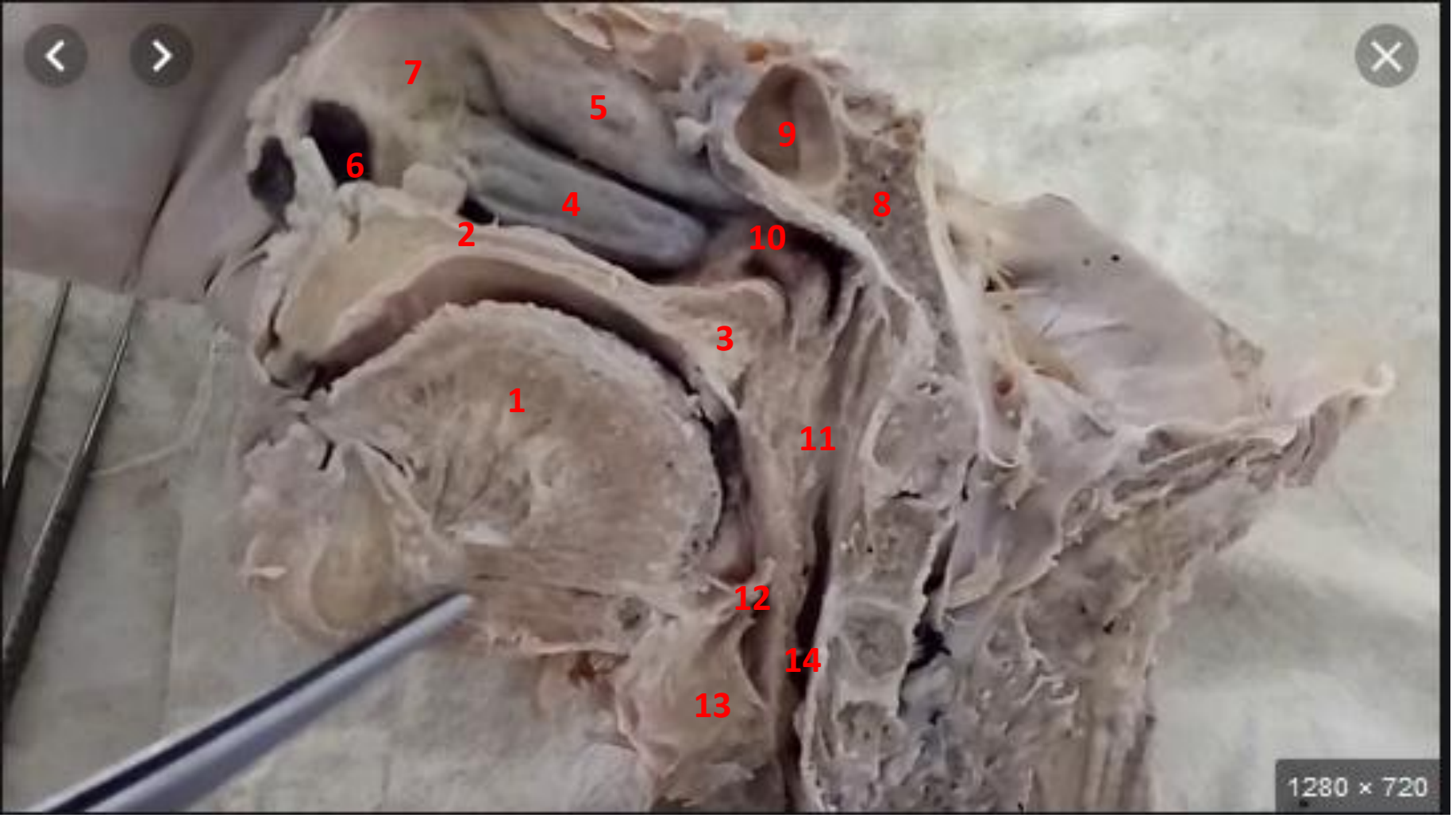
Arytenoid cartilage

Cricoid cartilage
"signet ring appearance"

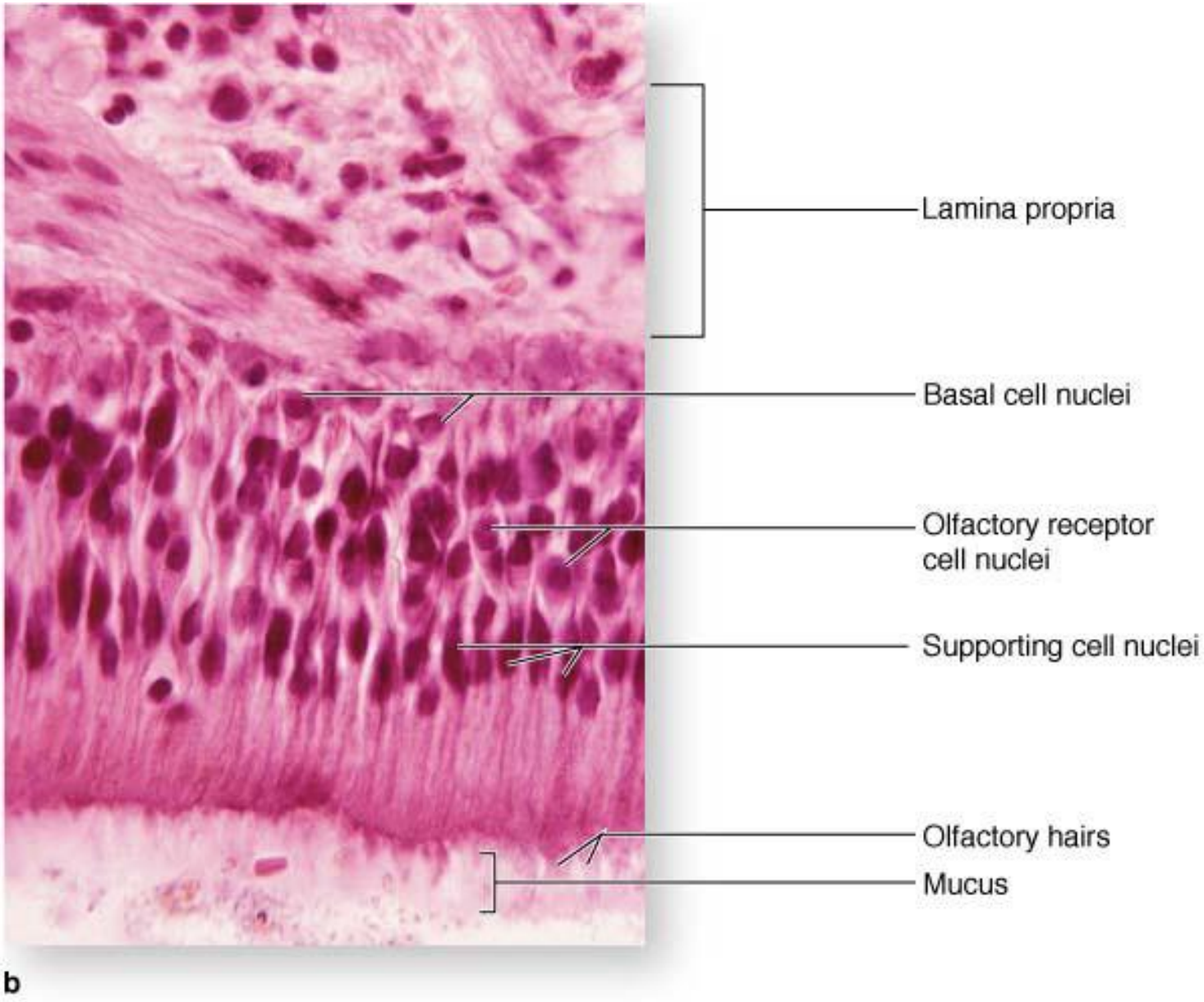

Sphenoid air sinus
Nasopharyngeal tonsil
Nasal septum
Tubal elevation
Hard palate
Pharyngeal opening of Auditory tube
Salpingopharyngeal fold
Tongue
Soft palate
Epiglottis
Palatine tonsil
Vestibule of larynx
Vestibular fold
Sinus of larynx
True vocal fold
Infraepiglotic part of larynx



1- soft palate
2-hard palate
3- inferior concha
4- middle concha
5- body of sphenoid and sphenoid air sinus
6-nasopharynx
7-oropharynx
8-epiglottis
9-laryngopharynx
V= Vestibule of the nose
A= Atrium of middle meatus



1- mouth cavity contain the tongue
2- hard palate
3- soft palate
4-inferior concha
5- Middle concha
6- vestibule of nose
7- Atrium of middle meatus
8- body of sphenoid bone
9- sphenoid air sinus
10-nasopharynx
11-oropharynx
12- epiglottis
13-vestibule of larynx
14- laryngopharynx

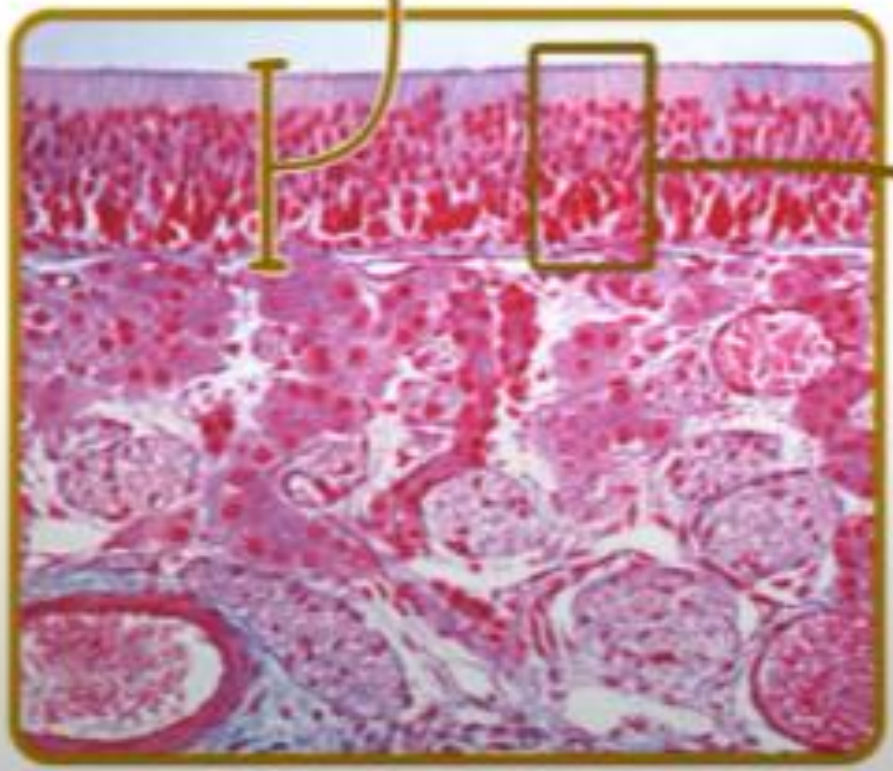


b

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

OLFACTORY EPITHELIUM

- PSEUDOSTRATIFIED CILIATED COLUMNAR CELLS
  - olfactory, sustentacular, & basal cells
    - lined with **OLFACTORY RECEPTORS**



LARYNX

EPIGLOTTIS

VESTIBULAR FOLDS
(FALSE VOCAL CORDS)

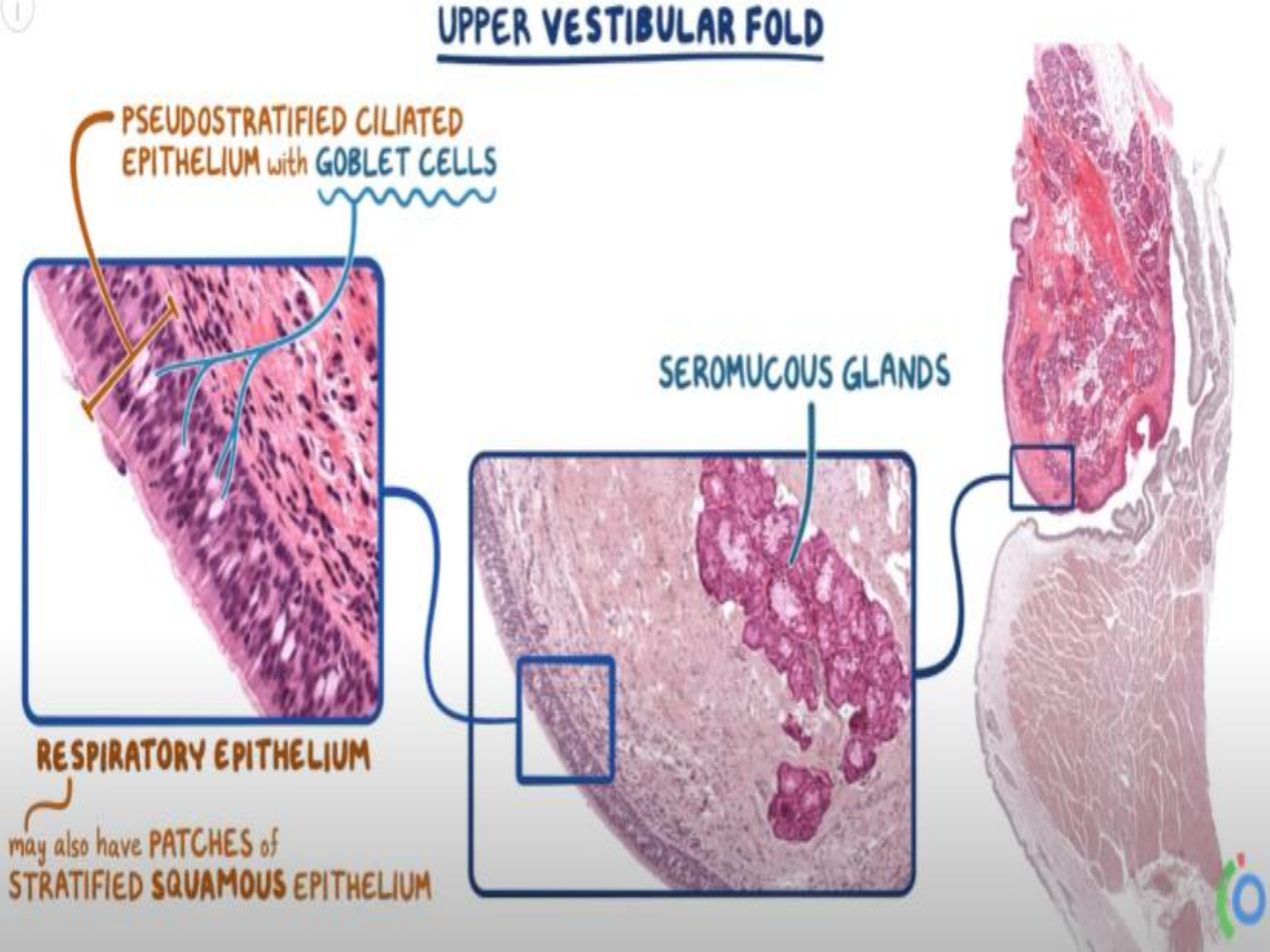
THYROID CARTILAGE

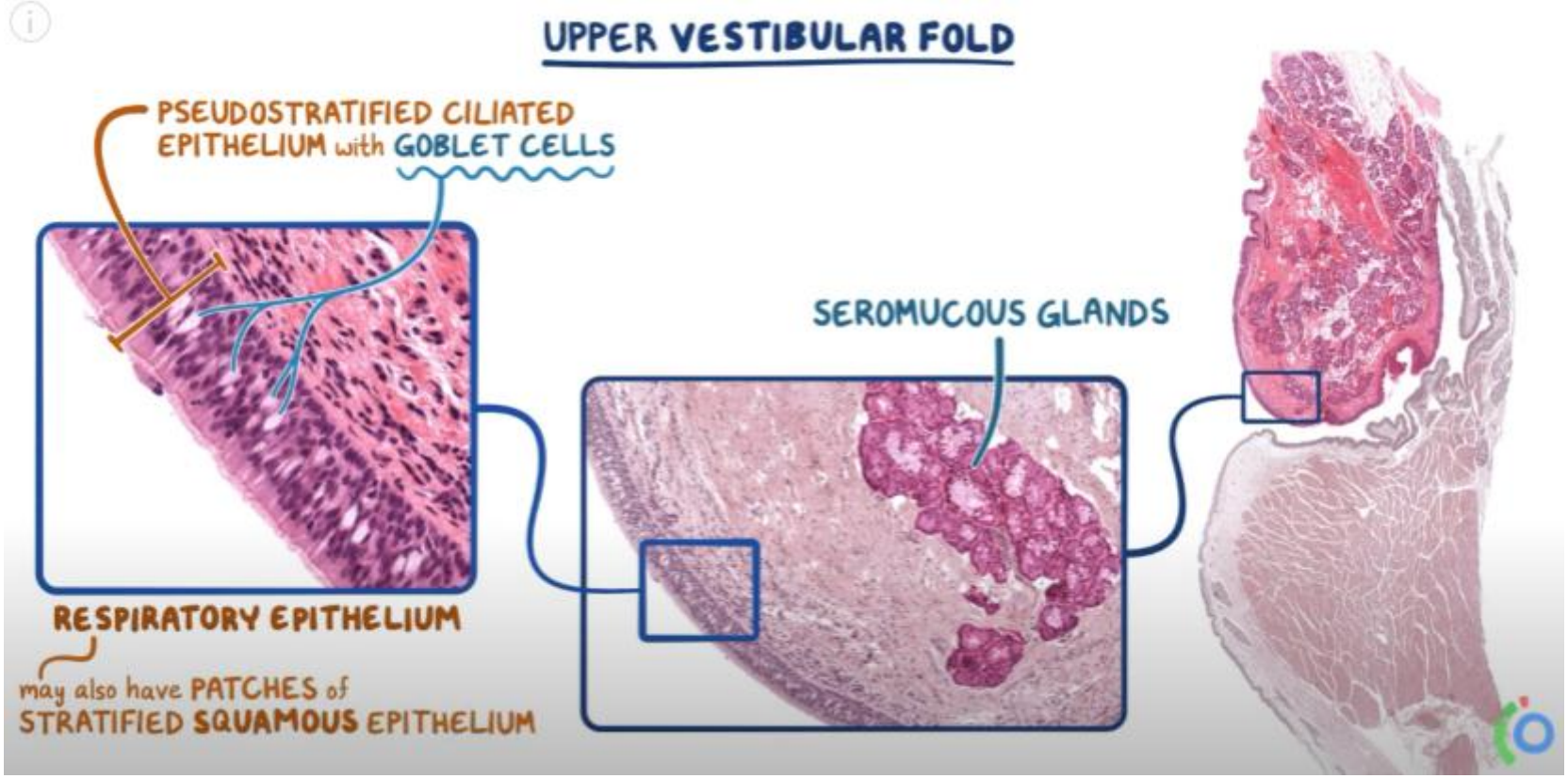
VENTRICLES

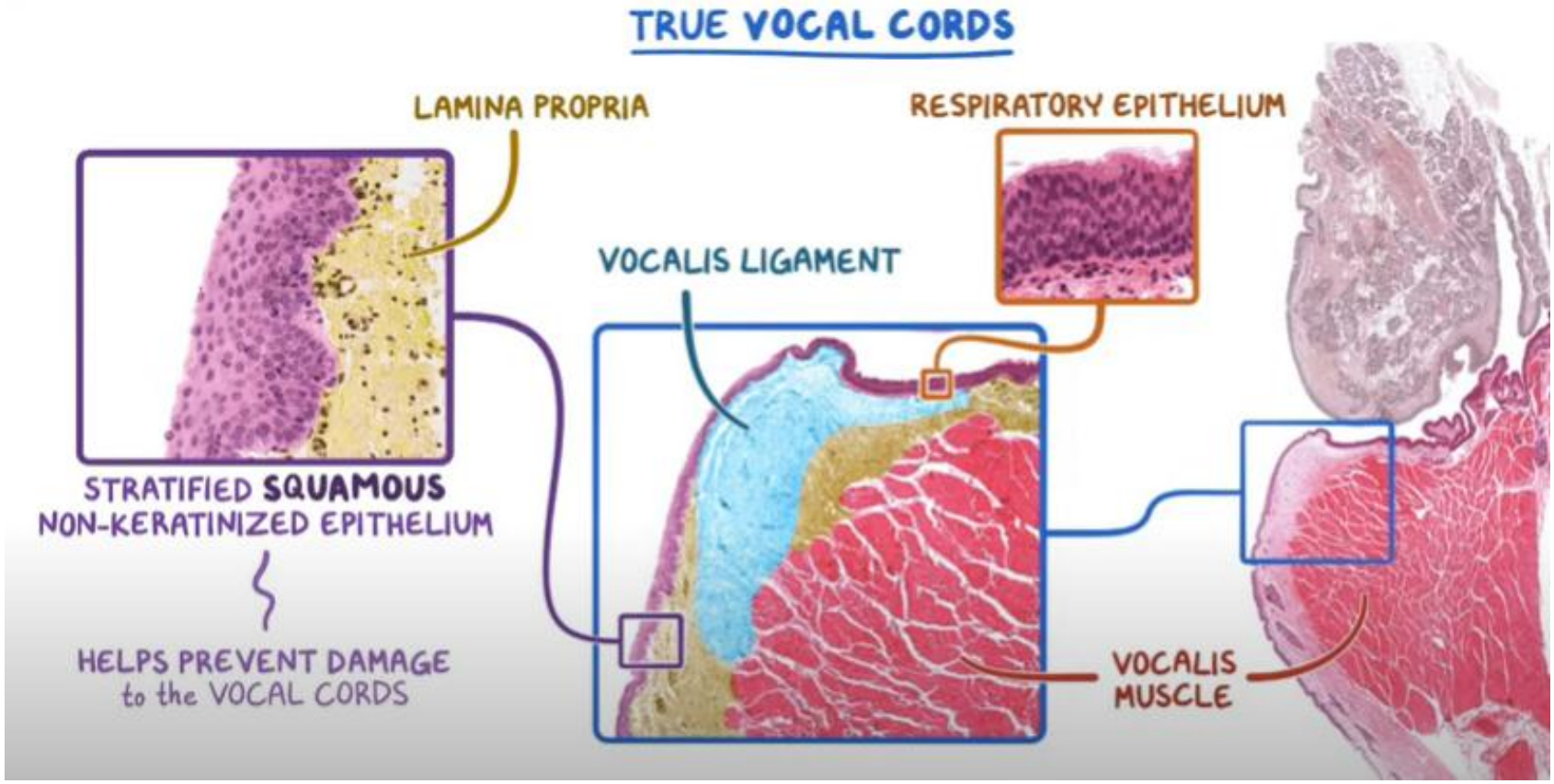
VOCAL FOLDS
(TRUE VOCAL CORDS)
└ VOCALIS MUSCLES
are STAINED DARKER

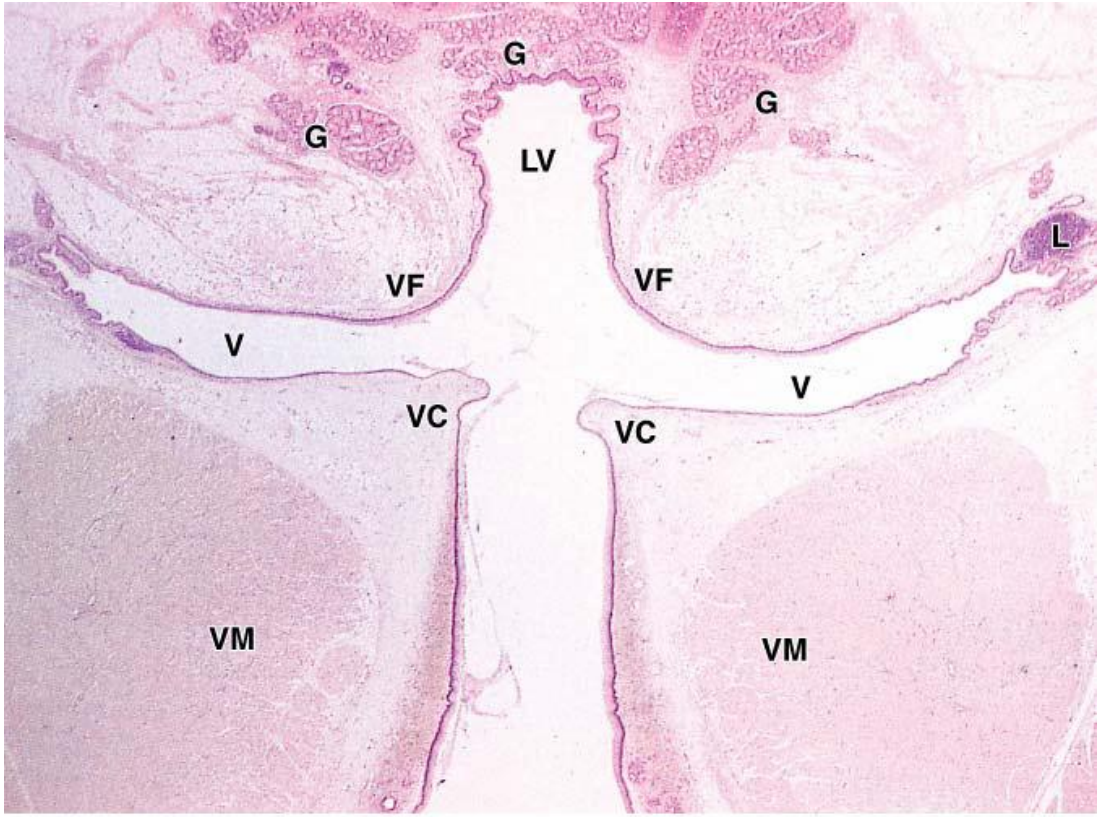
CRICOID CARTILAGE

UPPER VESTIBULAR FOLD




UPPER VESTIBULAR FOLD
PSEUDOSTRATIFIED CILIATED EPITHELIUM with GOBLET CELLS
SEROMUCOUS GLANDS
RESPIRATORY EPITHELIUM
may also have PATCHES of STRATIFIED SQUAMOUS EPITHELIUM

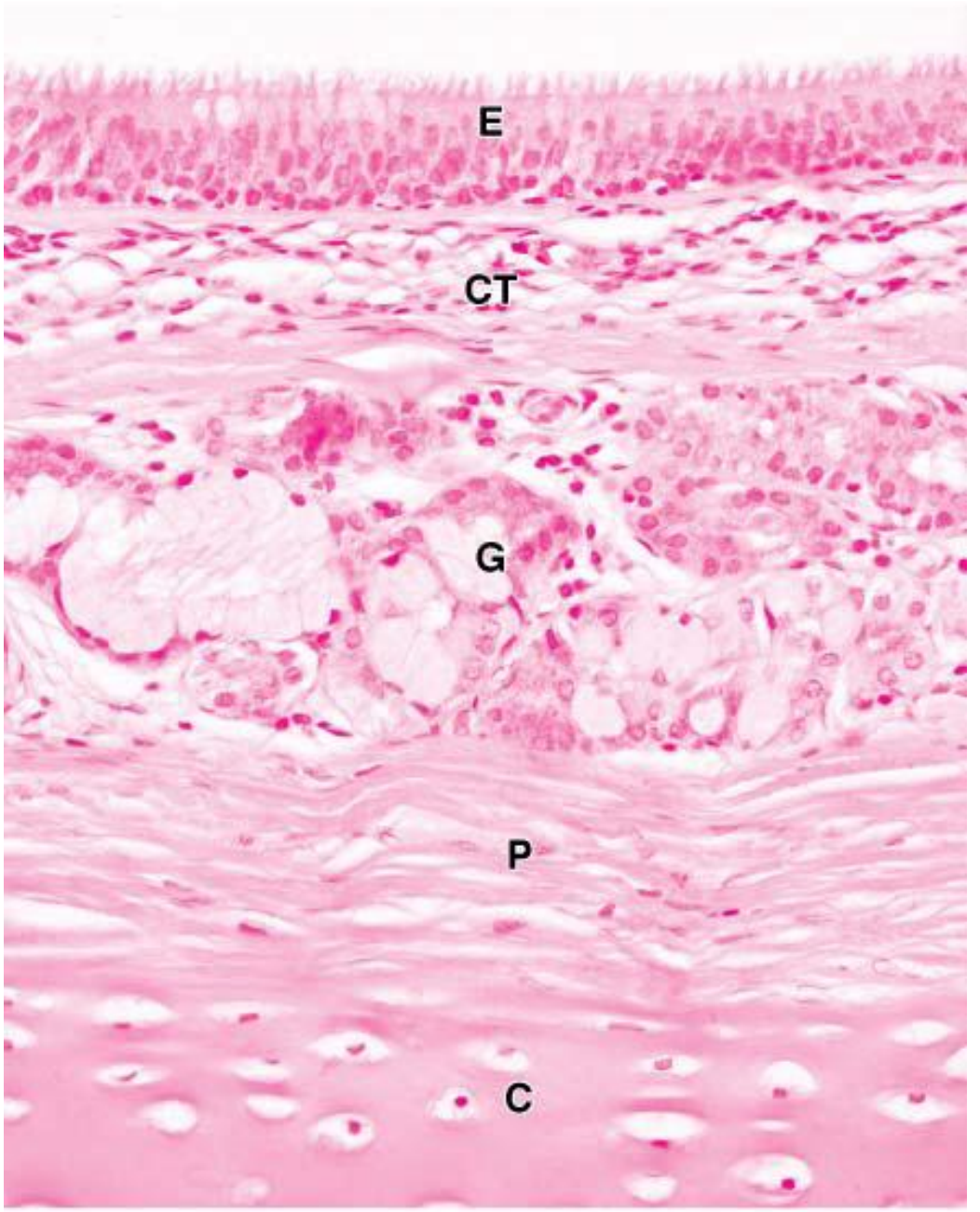

TRUE VOCAL CORDS
LAMINA PROPRIA
RESPIRATORY EPITHELIUM
VOCALIS LIGAMENT
STRATIFIED SQUAMOUS
NON-KERATINIZED EPITHELIUM
HELPS PREVENT DAMAGE
to the VOCAL CORDS
VOCALIS
MUSCLE



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)

Histology of trachea

The wall of the trachea is lined by typical respiratory epithelium (E) underlying 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).



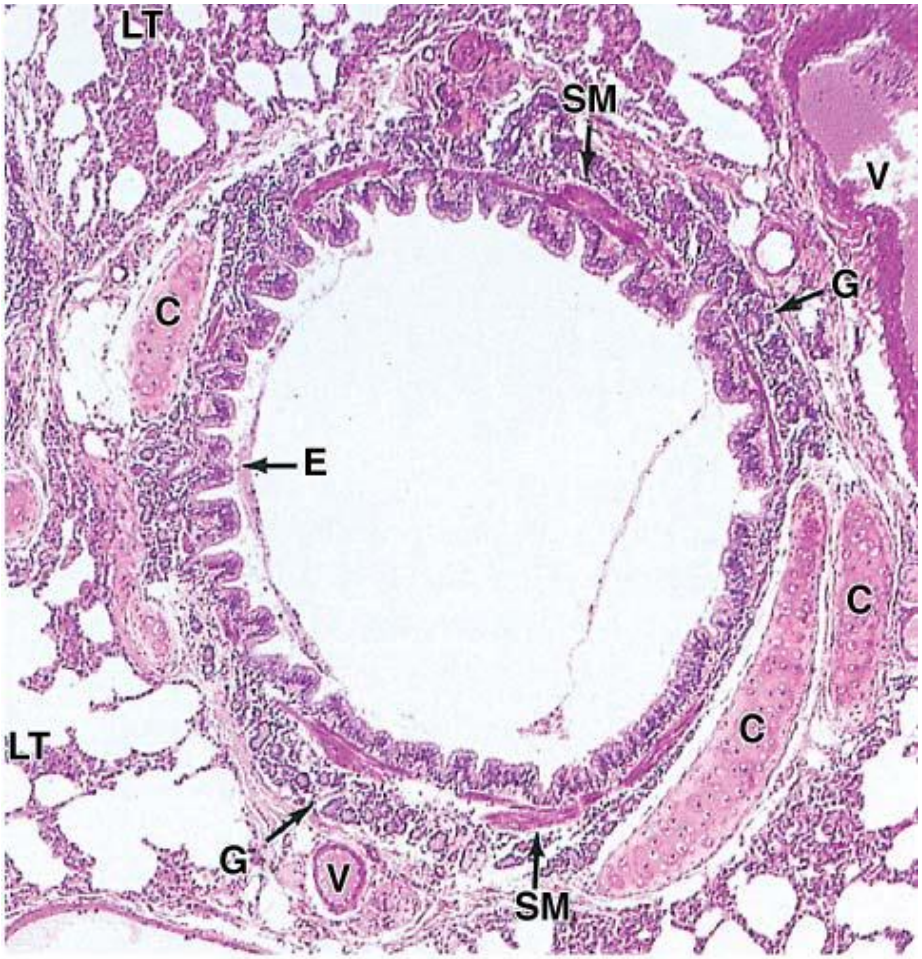
Source: Mescher AL: *Junqueira's Basic Histology: Text and Atlas, 12th Edition:* http://www.accessmedicine.com

Histology of bronchial tree

Bronchi (primary, secondary, tertiary)

- **Each primary bronchus branches repeatedly, with each branch becoming progressively smaller until it reaches a diameter of about 5 mm. The mucosa of the larger bronchi is structurally similar to the tracheal mucosa except for the organization of cartilage and smooth muscle.**

In the primary bronchi most cartilage rings completely encircle the lumen, but as the bronchial diameter decreases, cartilage rings are gradually replaced with isolated plates of hyaline cartilage. Abundant mucous and serous glands are also present, with ducts opening into the bronchial lumen. In the bronchial lamina propria is a layer of crisscrossing bundles of spirally arranged smooth muscle which become more prominent in the smaller bronchial branches.



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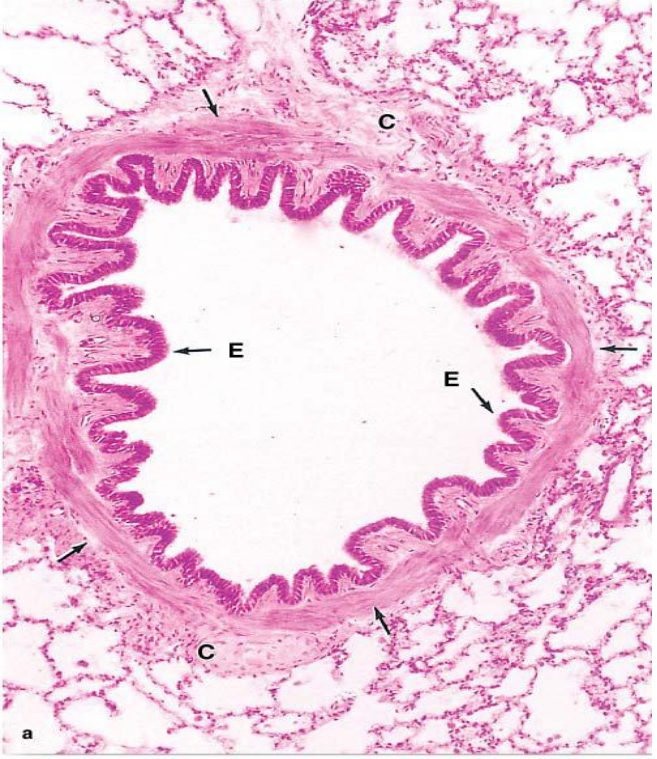
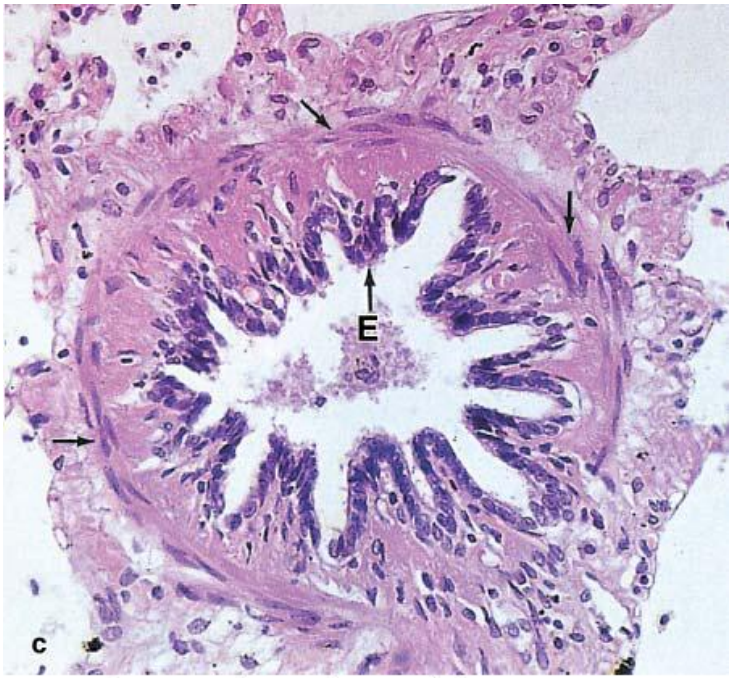
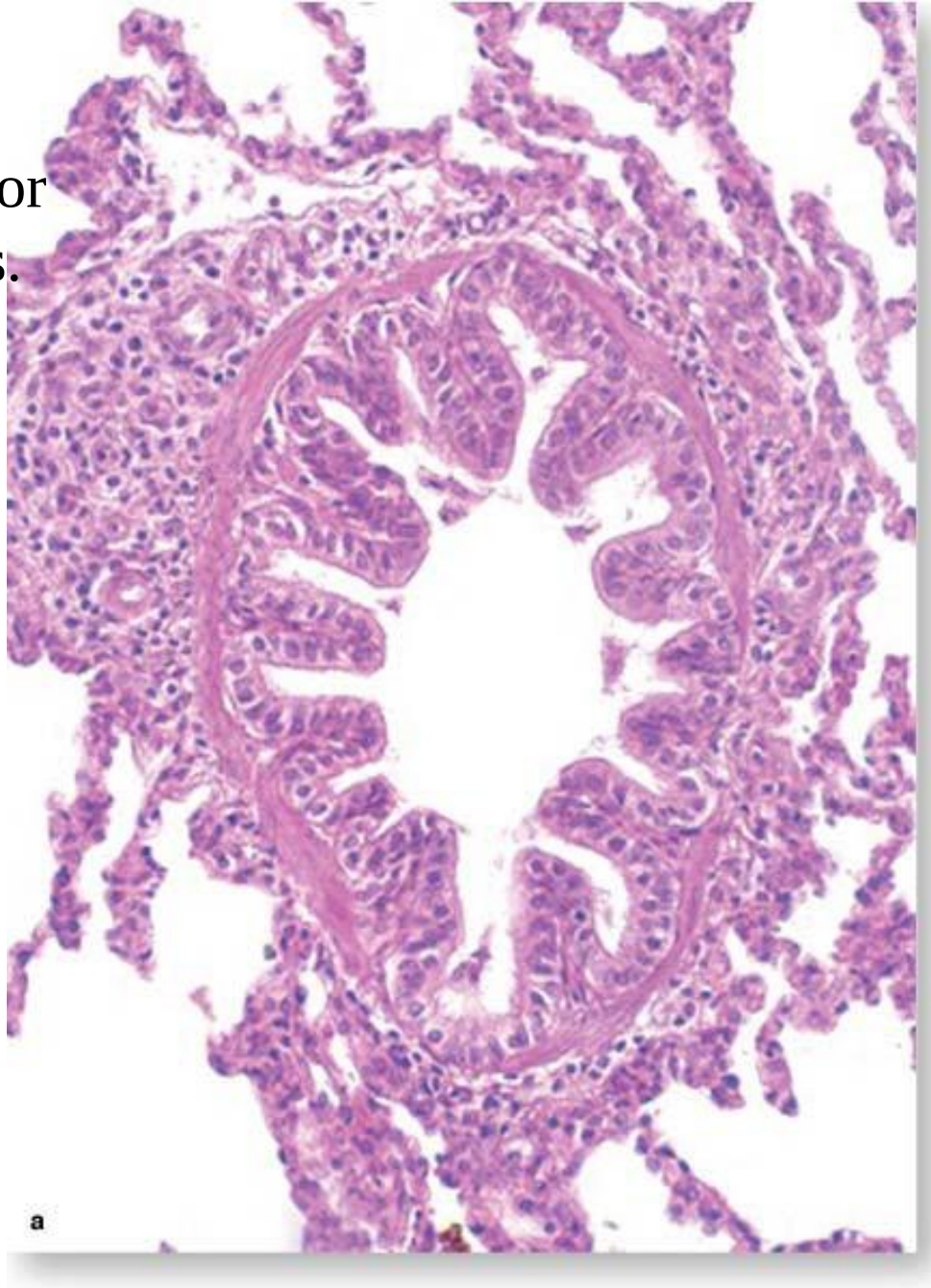


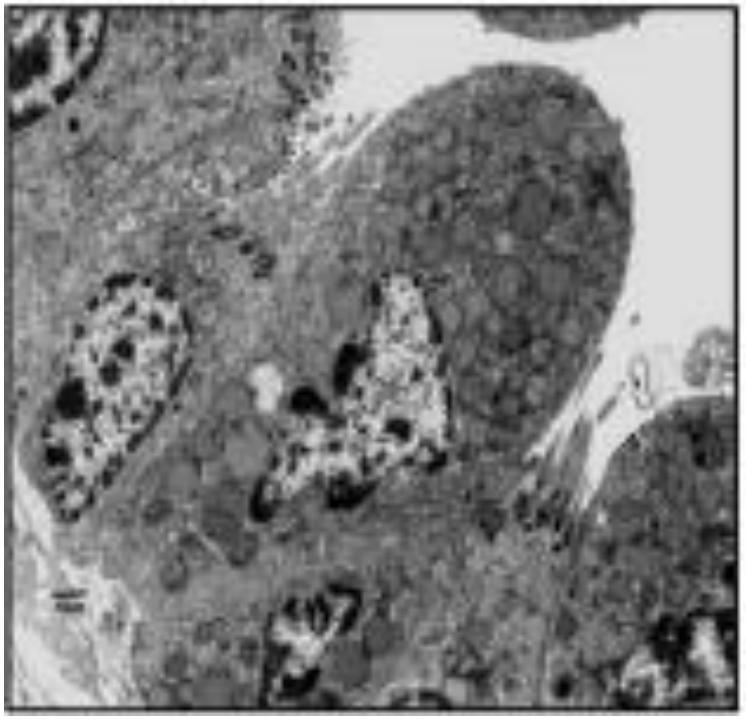


(a): A large bronchiole has the characteristically folded respiratory epithelium (E) and prominent smooth muscle (arrows), but is supported only by fibrous connective tissue (C) with no glands. **((c):** In very small bronchioles the epithelium (E) is reduced to simple low columnar and the several layers of smooth muscle cells (arrows) comprise a high proportion of the wall.

terminal bronchiole has only one or two layers of smooth muscle cells. The epithelium contains ciliated cuboidal cells and many low columnar nonciliated cells (clara cells).



- **Clara cell Site:** **Present in** terminal **bronchioles. It is scattered between ciliated cells. - L/M: it is a tall, non ciliated dome-shaped cell. - E/M: numerous mitochondria, rER, well developed Golgi and apical electron dense secretory granules. It shows short blunt microvilli**
- **Function: Secrete serous secretion rich in protein which has anti-inflammatory function.**



Anatomy Lab 2:

*Thoracic cage

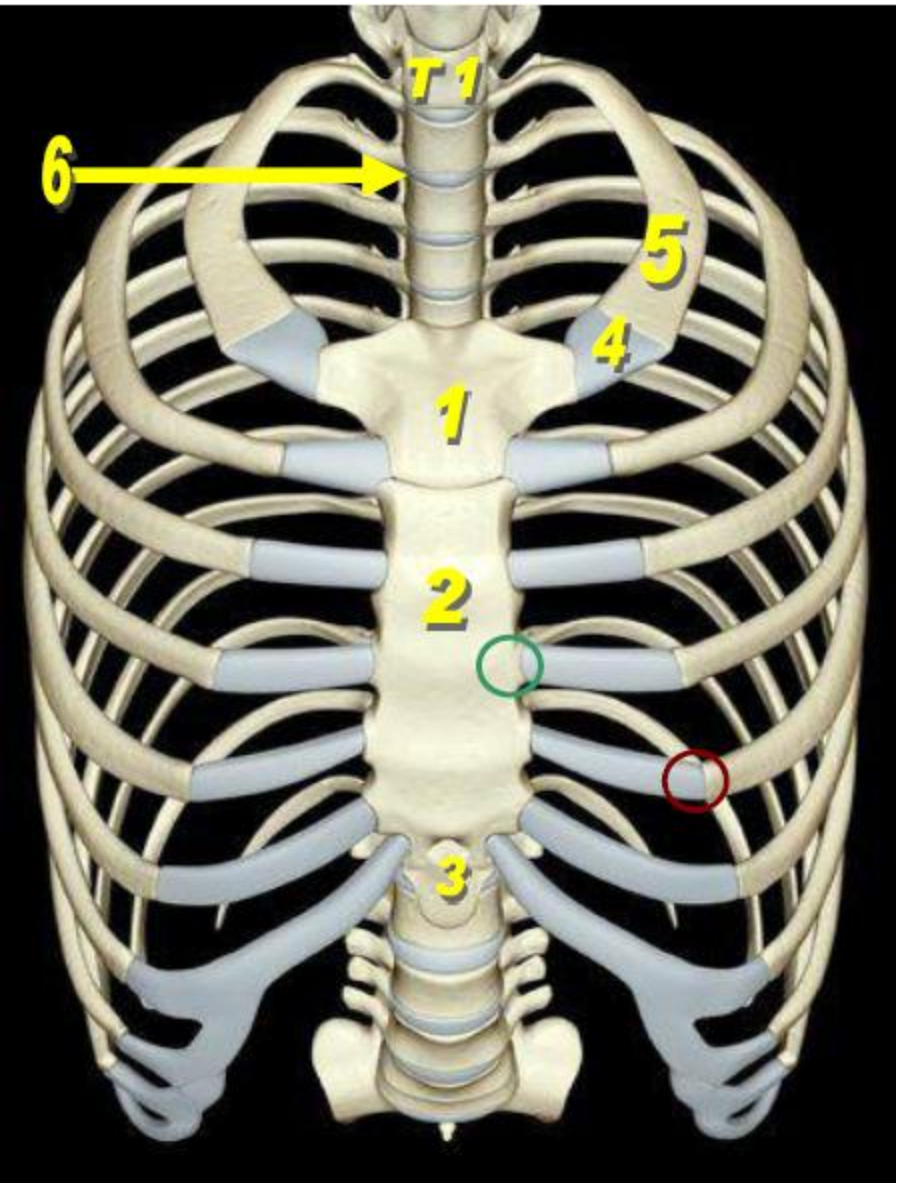
*lung & Pleura

*Mediastinum

*Radiological Anatomy of the Thorax

*Examples of congenital Anomalies

Bones of the thorax



1- Manubrium
2- Body of sternum
3- Xiphoid process
4- 1st costal cartilage
5- 1st Rib
6-Intervertebral disc
Sternocostal joint
Costochondral joint

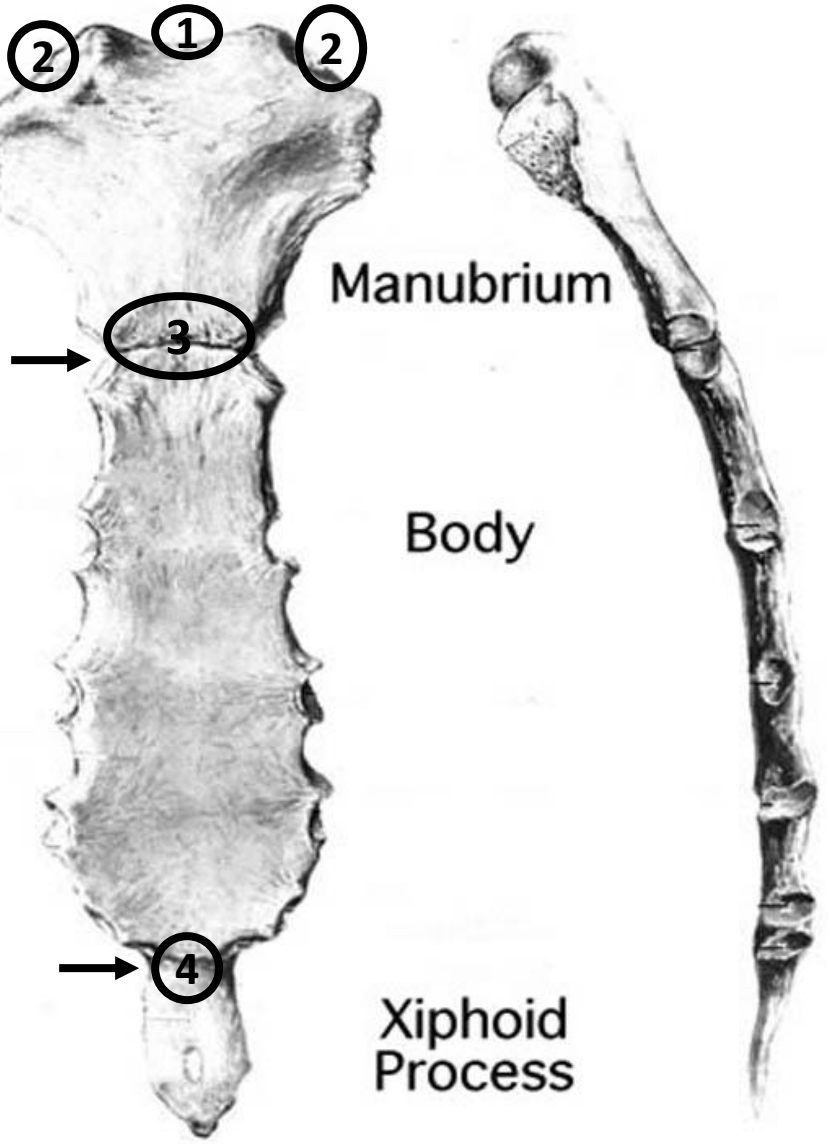
Boundries	Thoracic inlet	Thoracic outlet
posterior	T1 vertebra	T12 vertebra
lateral	1st rib	11th and 12th rib
Anterior	Manbrium sterni	Costal margin and xiphoid process

STERNUM

*Type: flat bone.
*Site: Anterior chest wall
1. Jugular notch.
2. Clavicular notch.
*Parts: Manubrium sterni, body and Xiphoid process

*Joints formed by this bone:

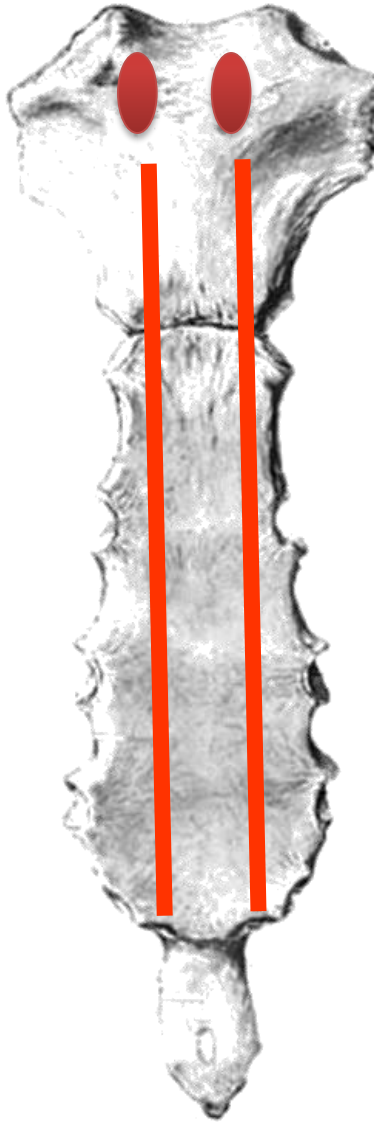
1-Sternoclavicular joint .
(saddle synovial J).
2- sternocostal joints.
3. Manubrio-sternal joint (sternal angle) (2ry cartilagenous J).
4. Xiphi-sternal joint
(2ry cartilagenous J)



Anterior surface

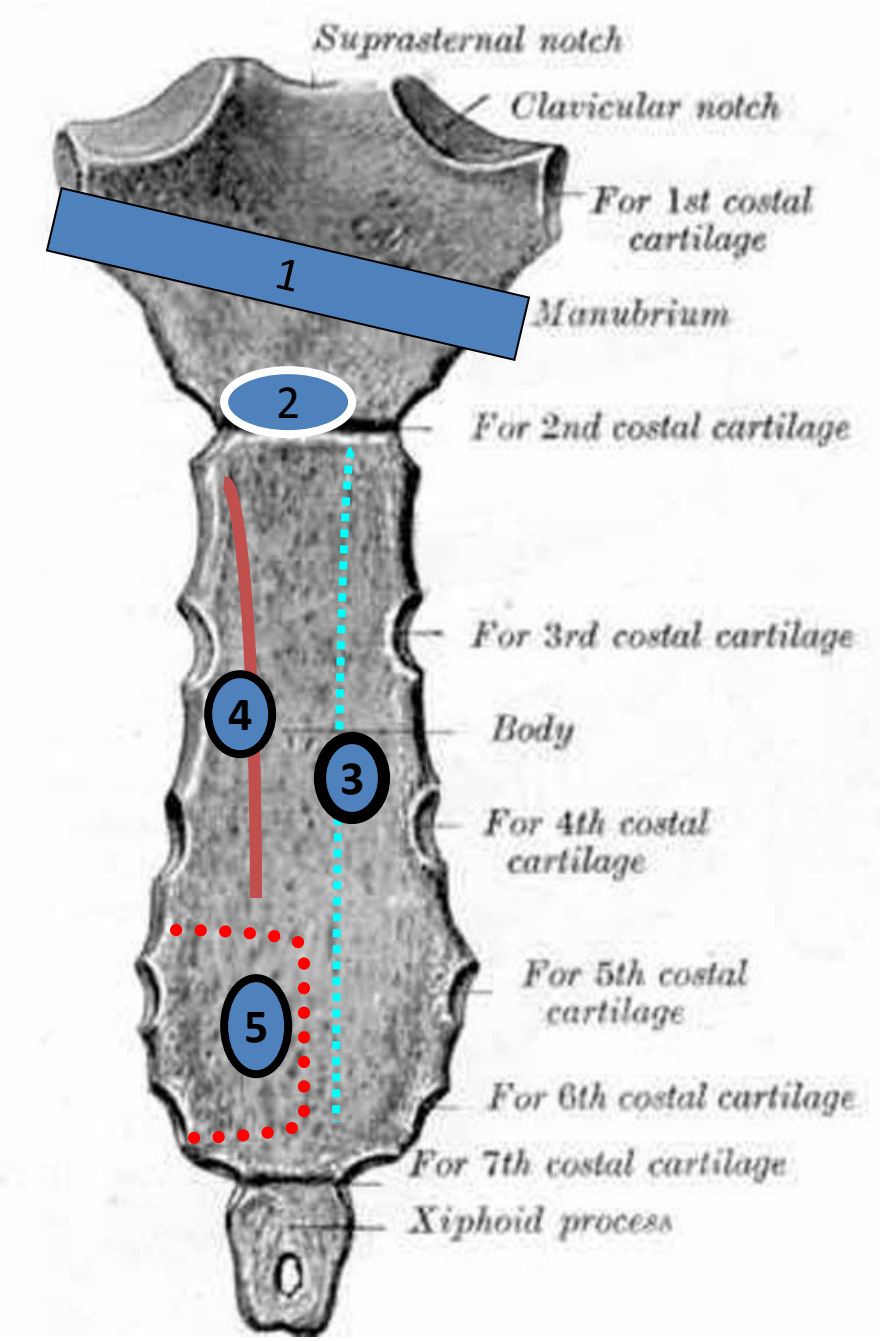
the structure attached to the marked area:

Pectoralis major muscle



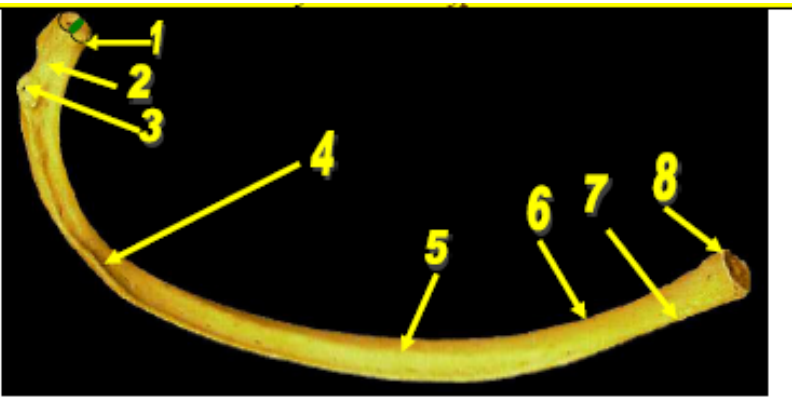
the structure <u>related</u> to the back of sternum (the marked area)

1. Lt. brachio-cephalic V.
2. Arch of aorta.
3. Right lung & Rt. Pleura.
4. Left lung& Lt. pleura.
5. Heart & pericardium.



RIBS

Typical rib



1- Head
2- Neck
3- Tubercle
4- Costal groove
5- Inner surface
6- Upper border
7- Lower border
8-Anterior end (concave)
9- Rib angle
Two articular demifacets separated by a crest

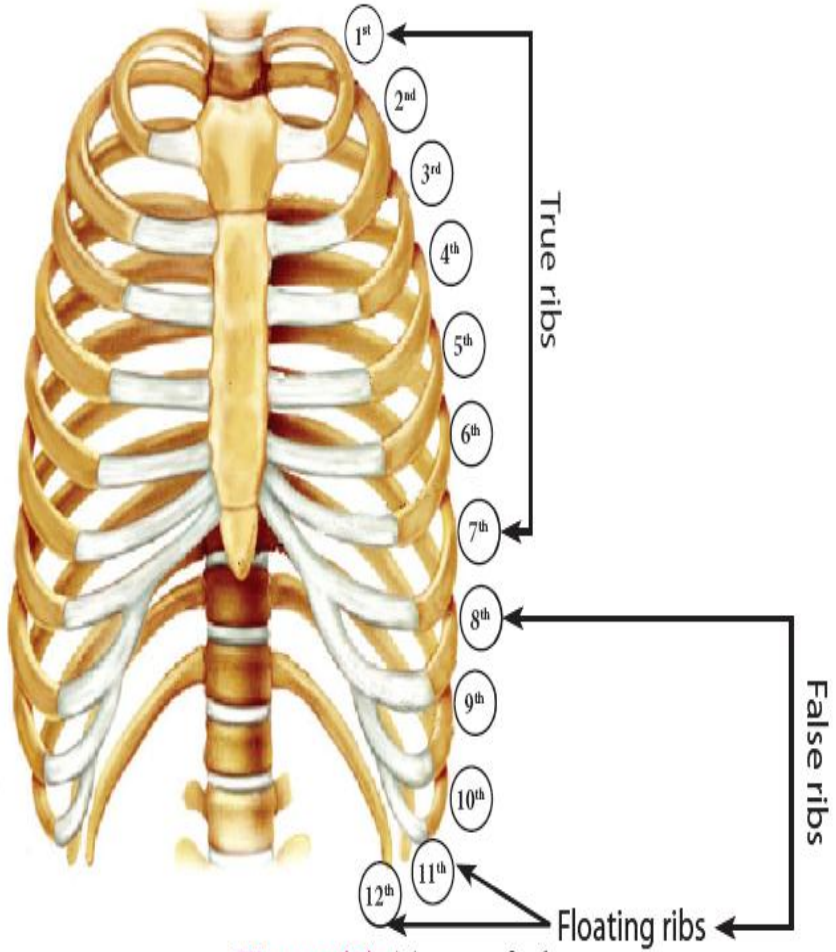
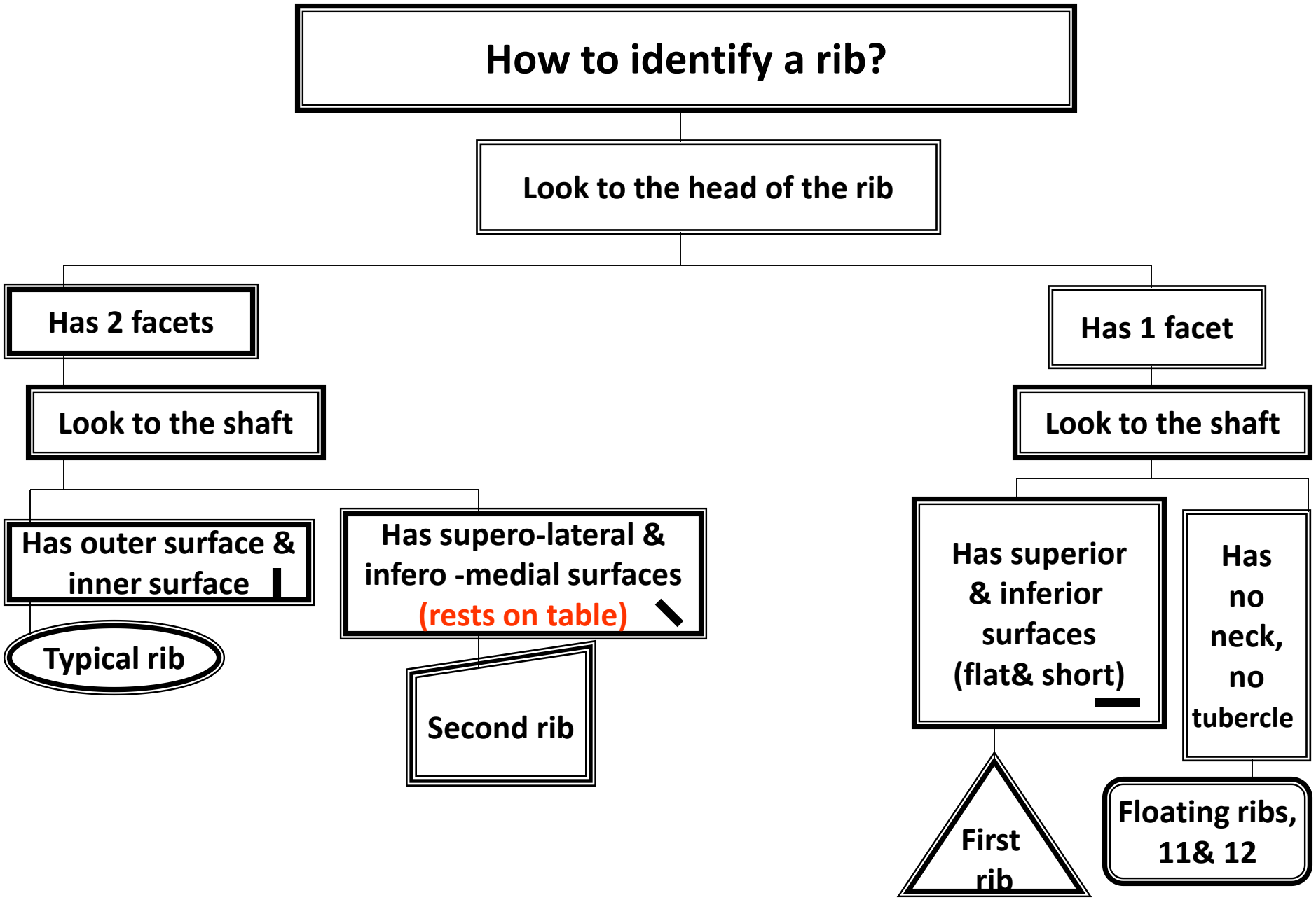


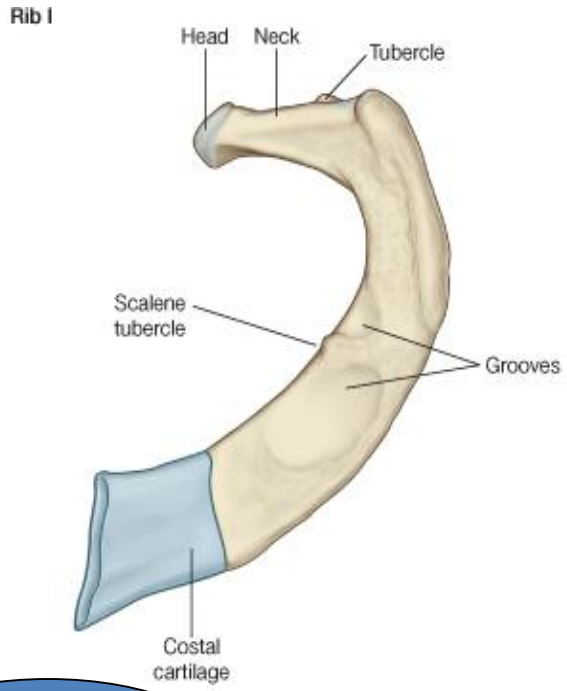
Figure (8): Types of ribs.

Joints formed by the rib:

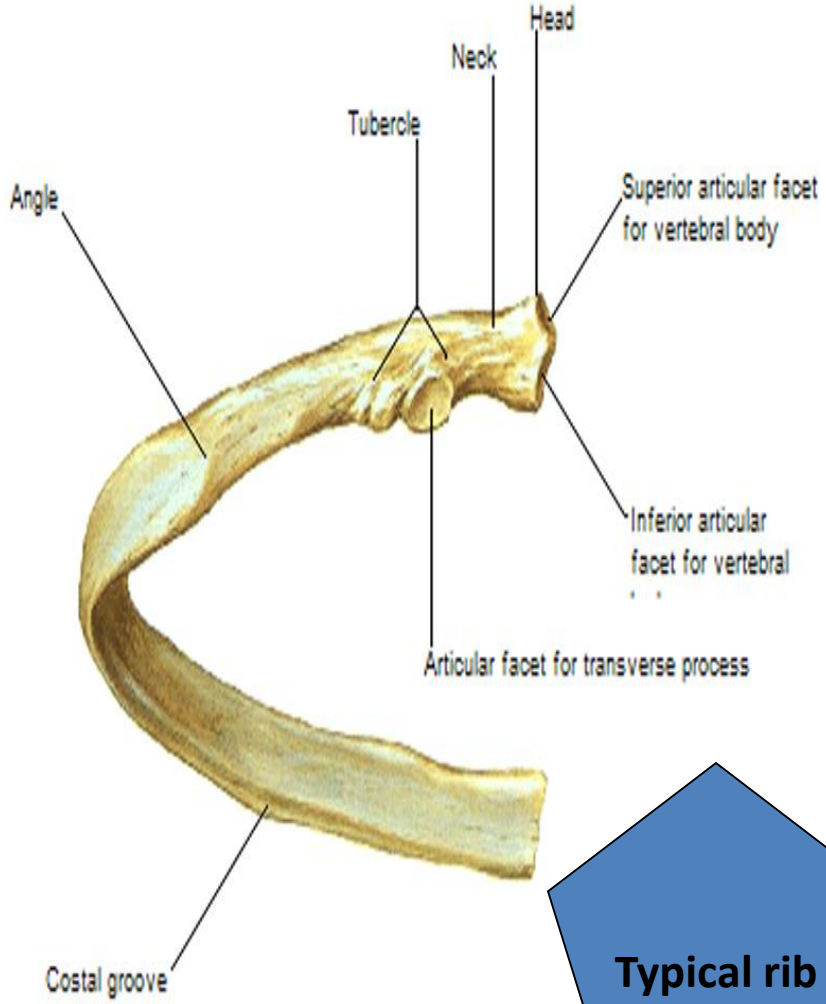
1-costovertebral joint: plane synovial joint.

2-costotransverse joint: plane synovial joint.


How to identify a rib?
Look to the head of the rib
Has 2 facets
Look to the shaft
Has outer surface & inner surface
Typical rib
Has supero-lateral & infero -medial surfaces
(rests on table)
Second rib
Has 1 facet
Look to the shaft
Has superior & inferior surfaces (flat& short)
First rib
Has no neck, no tubercle
Floating ribs, 11& 12



First rib



Typical rib

Floating rib

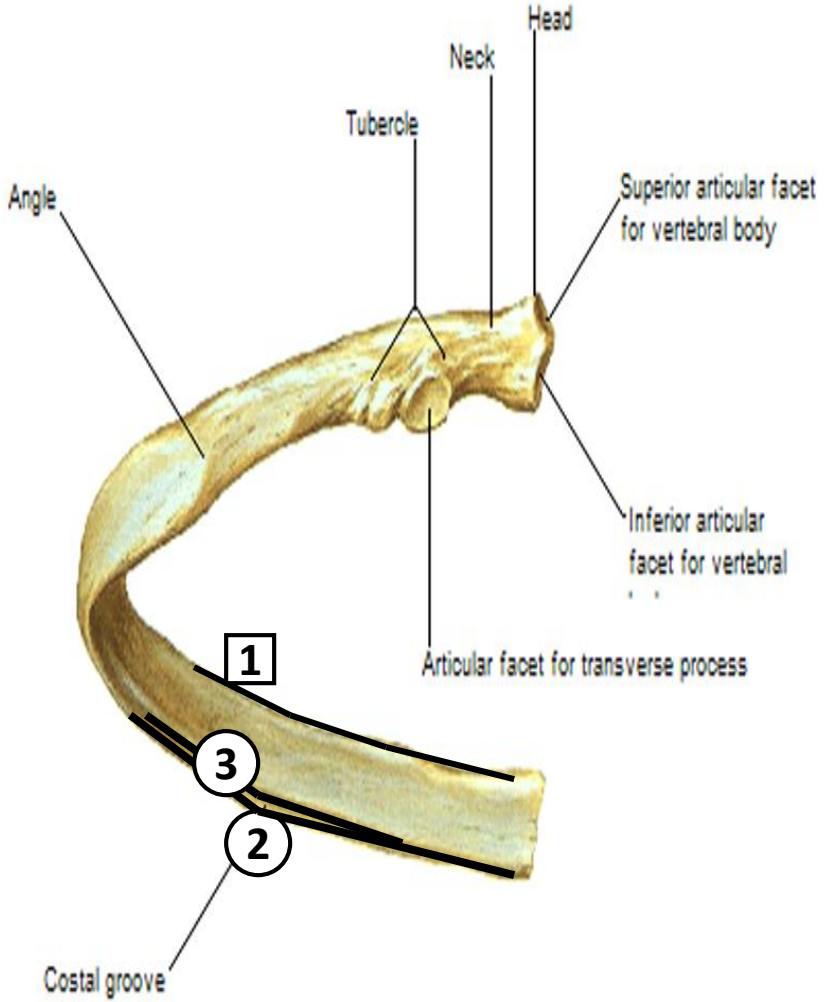
The structure attached to:

1. **External, internal & inner most intercostal muscles.**
2. **External intercostal muscle.**

The structure related :

Costal groove:

3. Posterior intercostal vein & artery and intercostal nerve.



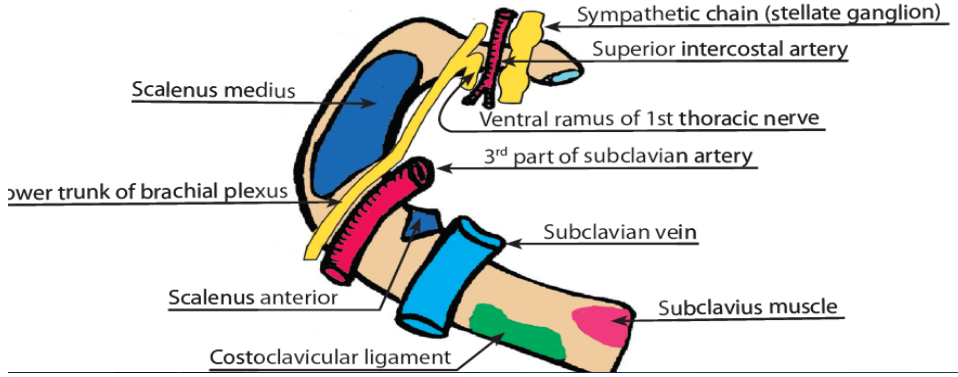
First Rib:

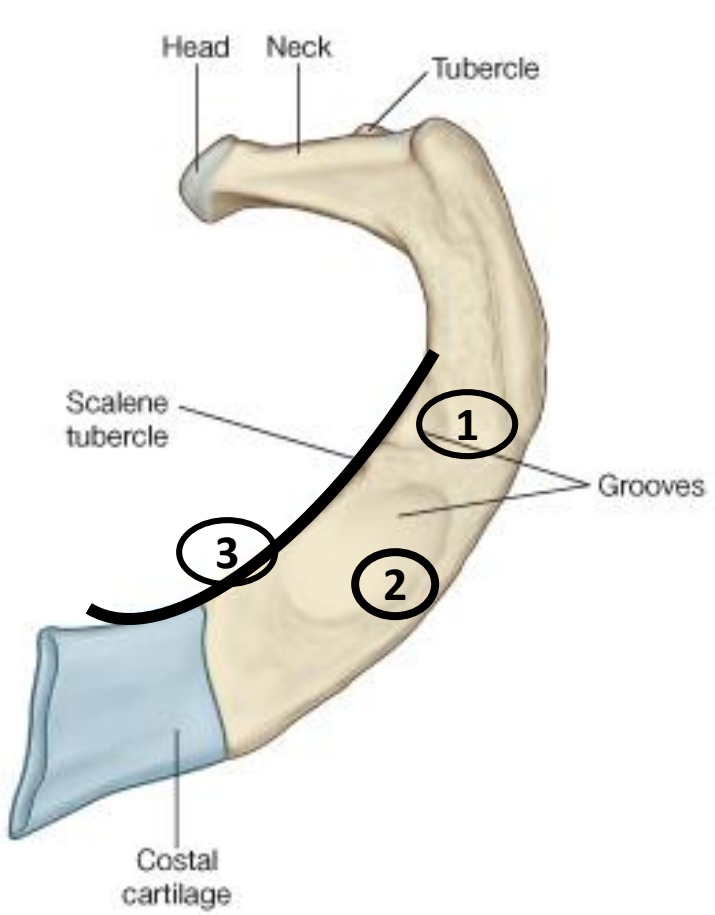
The structure related to the marked area.

1. **Subclavian artery.**
2. **Subclavian vein.**

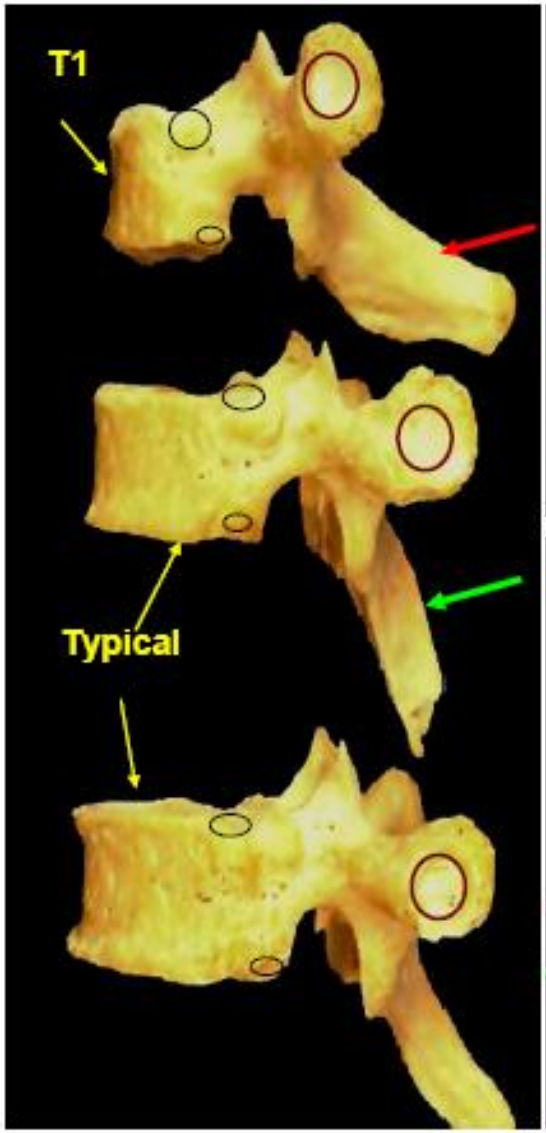
***The structure attached to the marked area.**

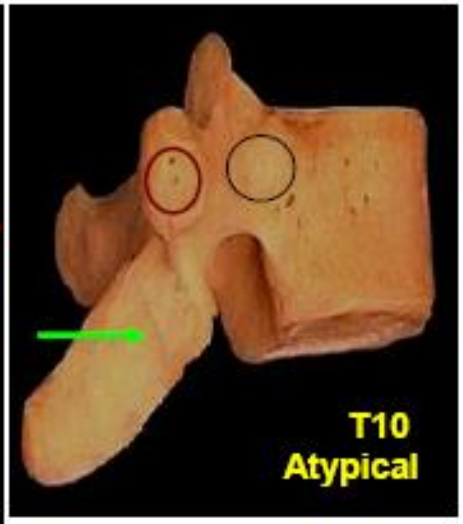
3. Suprapleural membrane





THORACIC VERTEBRAE





Typical Thoracic vertebrae- Upper and lower demifacet

Atypical Thoracic vertebrae- one complete facet

T1- Upper complete facet and lower demifacet

T1- Horizontal spine

Oblique spine

Articular facet on transverse process

12 thoracic vertebra
2-9 typical
1,10,11,12 Atypical

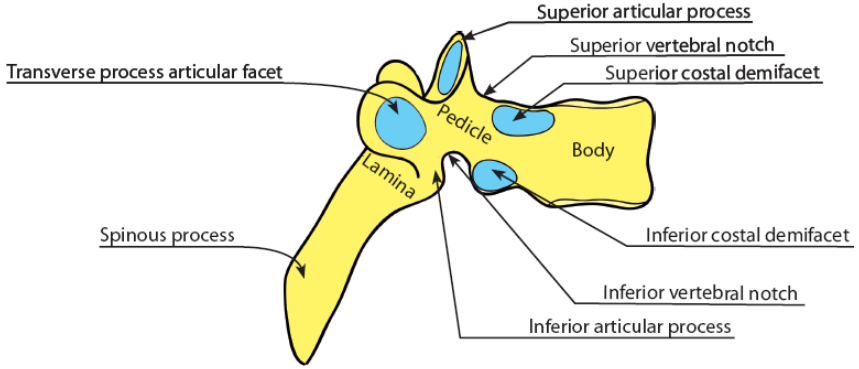


Figure (3): Typical thoracic vertebra, lateral view.

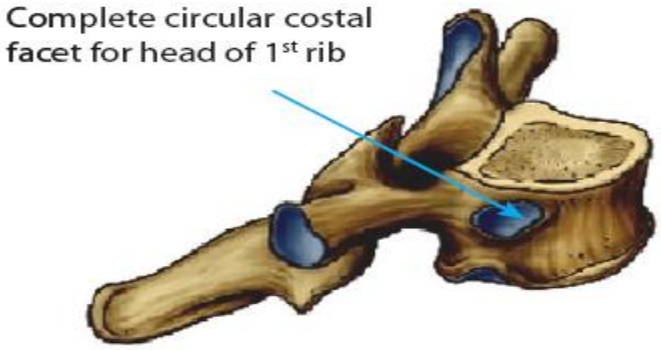


Figure (4): First thoracic vertebra.

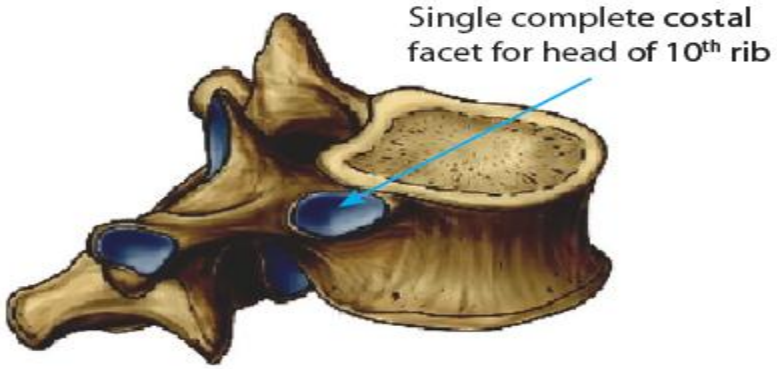


Figure (5): Tenth thoracic vertebra.

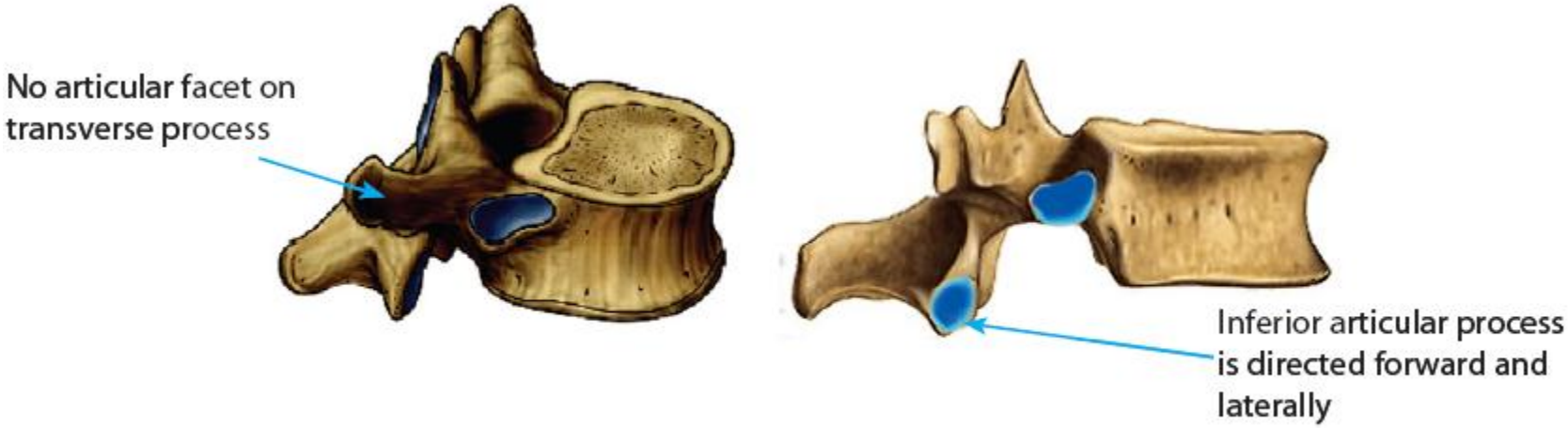
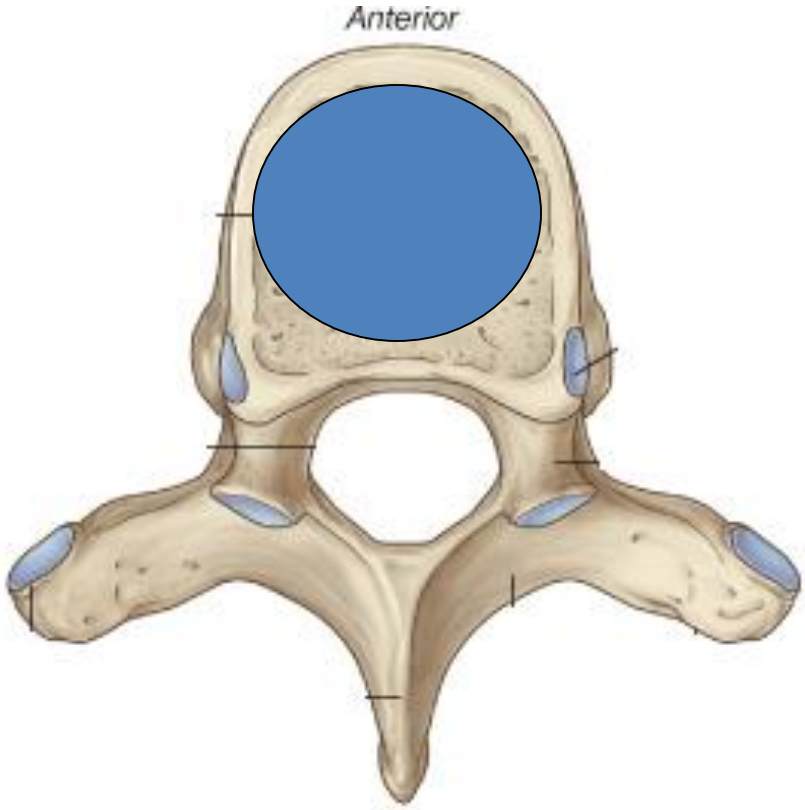


Figure (6): Eleventh and twelfth thoracic vertebrae.

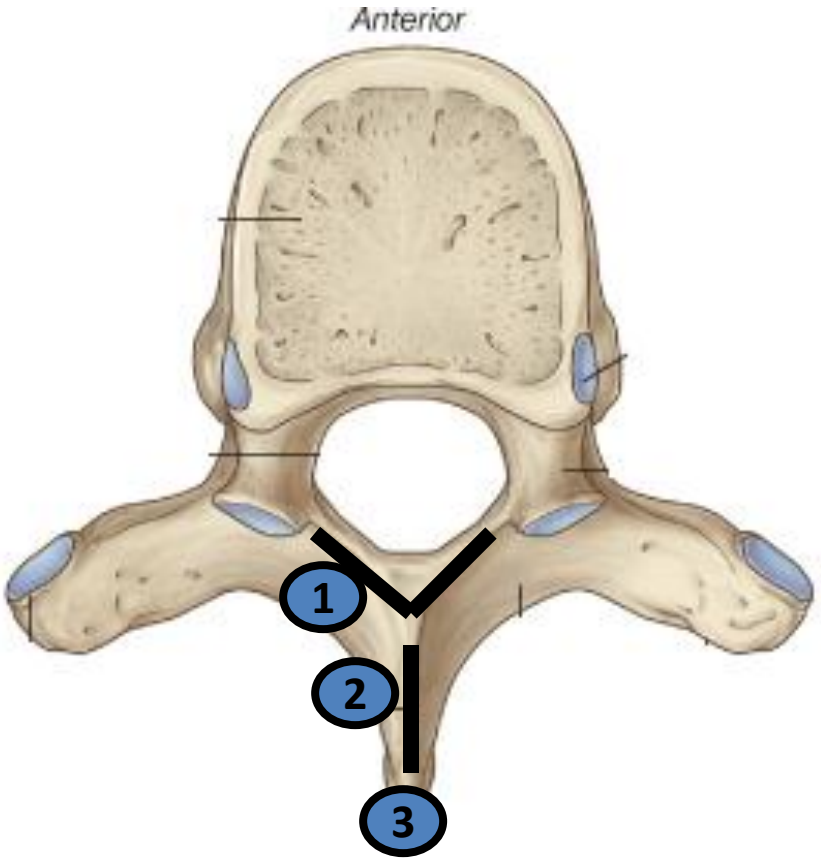
The structure related to the marked area:

Inter - vertebral disc.
(Secondary cartilaginous J).



The structure attached to the marked area.

1) Ligamentum flavum.
2) Inter - spinous ligament.
3) Supra-spinous ligament.

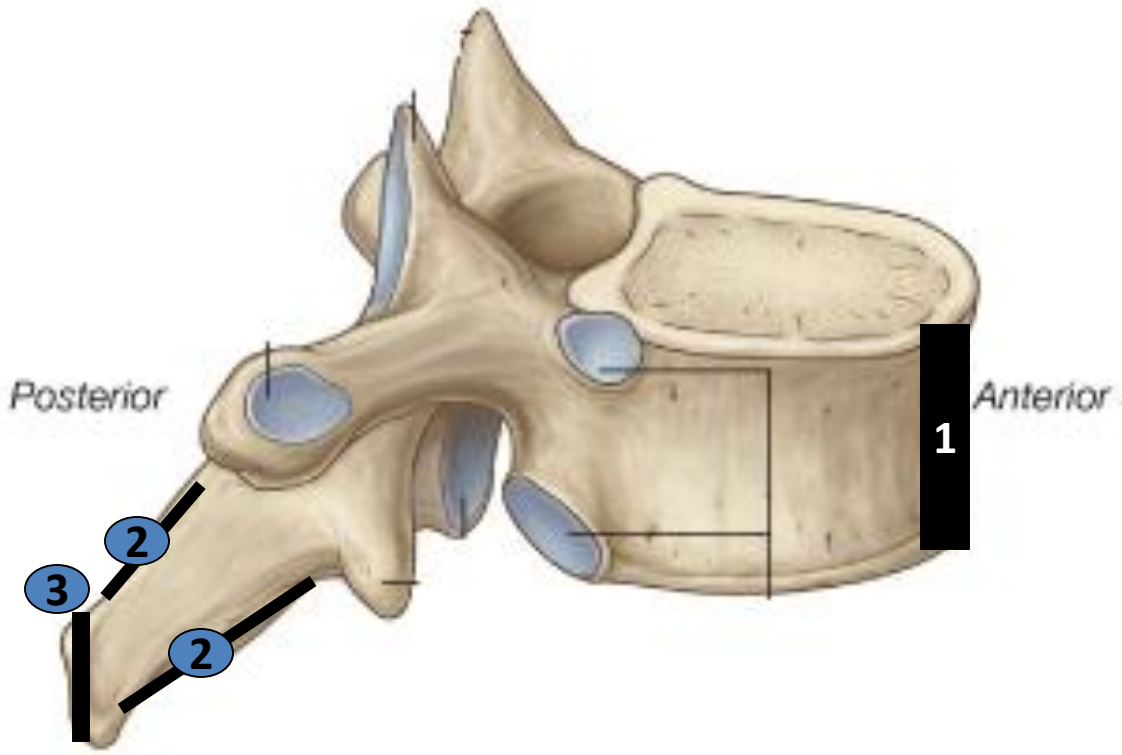


the structure attached to the marked area:

1) Anterior longitudinal ligament.

2) Interspinous ligament.

3) Supra spinous ligament.



Identification of the side of the lung

- **The apex** → Is directed up.
- **The Hilum** → Is directed Medially.
- **The anterior border** → Is thin & sharp.

● The right lung has 3 lobes → Superior, middle & inferior & 2 fissures → Oblique & transverse (horizontal)

● The left lung has only 2 lobes → Superior & inferior & 1 fissure → Oblique.

- The anterior border of the left lung presents cardiac notch & lingula.

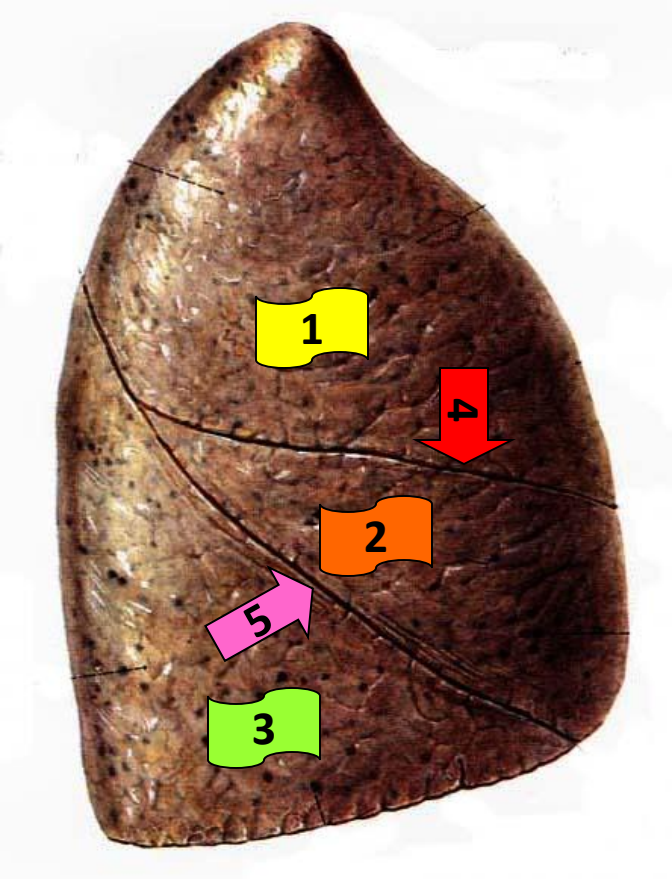
Right lung

Costal surface

1. Superior lobe.
2. Middle lobe.
3. Inferior lobe.
4. Transverse (horizontal) fissure
5. Oblique fissure.

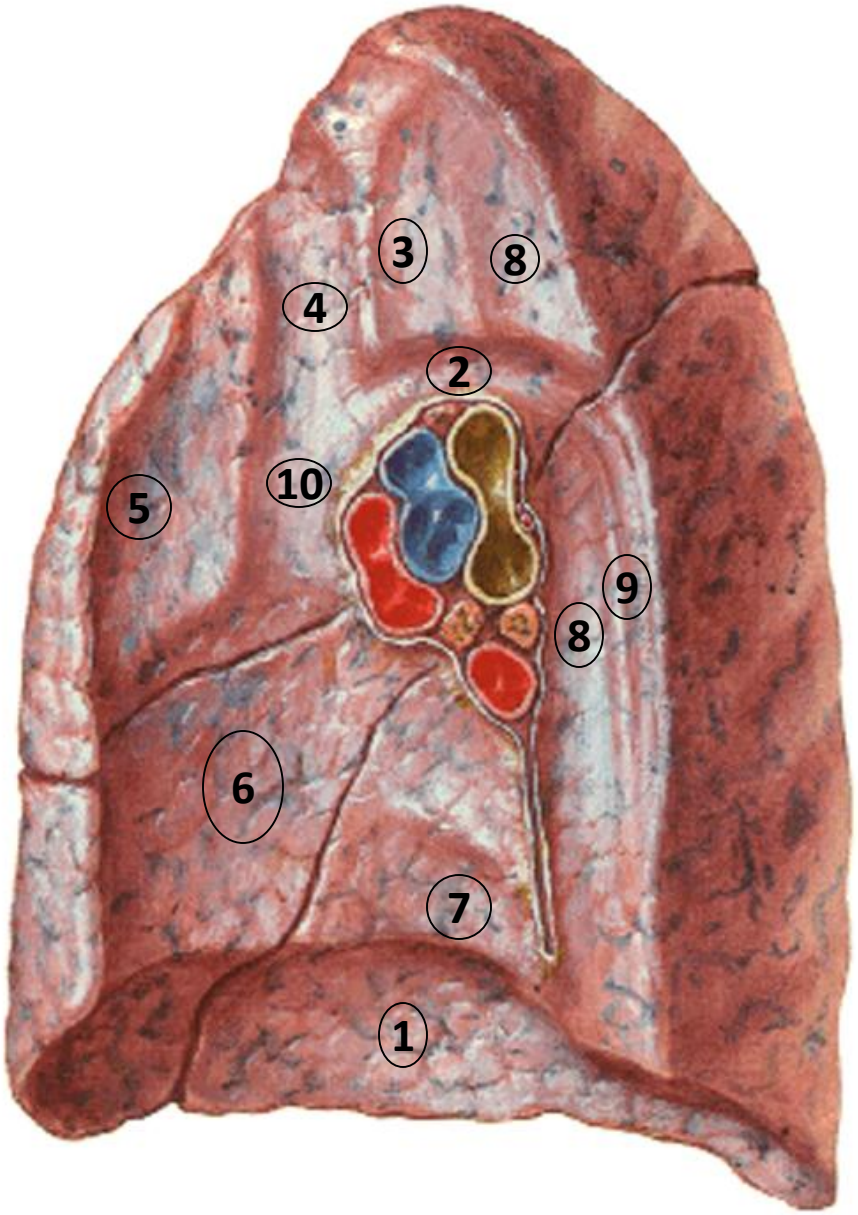
* Costal surface is related to:

1. Costal pleura.
2. Thoracic wall.



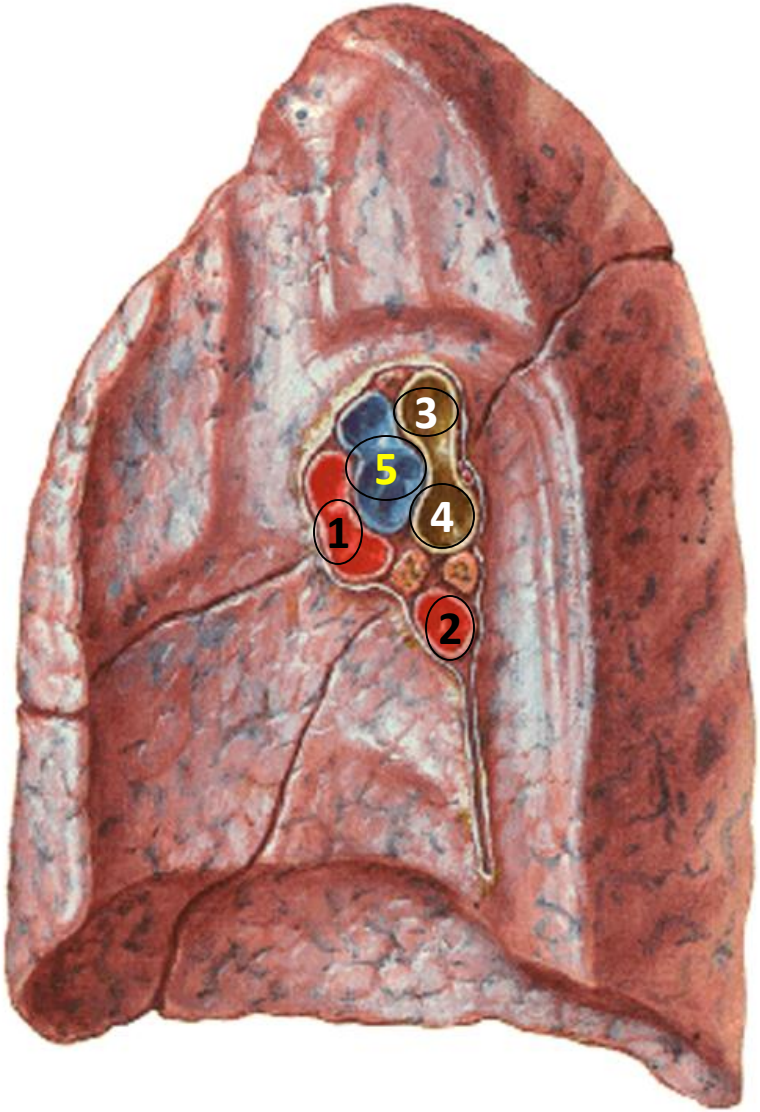
Medial surface

1. Base → Related to right cupola of diaphragm.
2. Arch of azygos vein.
3. Trachea & rt. vagus nerve.
4. Rt. Brachiocephalic vein
5. Ascending aorta & thymus gland.
6. Rt. Atrium.
7. I.V.C.
8. Esophagus.
9. Azygos vein.
10. SVC



Hilum

1. **Superior pulmonary vein →**
   Most anterior structure.
2. **Inferior pulmonary vein →**
   Most inferior structure.
3. **Ep-Arterial bronchus →**
   Most posterior structure, have rigid wall & above the pulmonary artery .
4. **Hyp-Arterial bronchus →**
   Most posterior structure, have rigid wall & below the pulmonary artery .
5. **Right pulmonary artery →**
   Anterior to & in between the 2 bronchi.



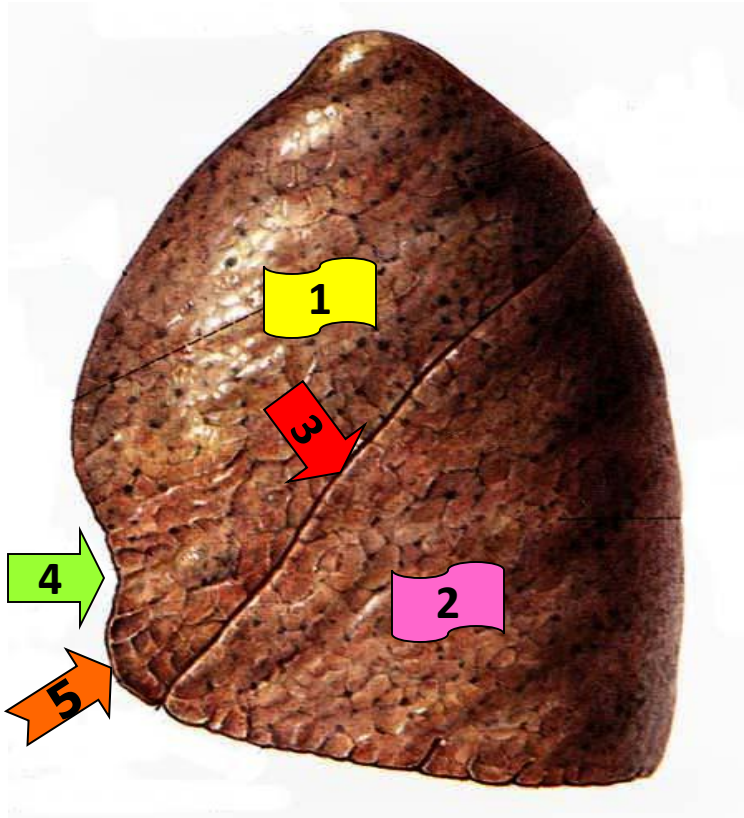
Left lung

Costal surface

1. Superior lobe.
2. Inferior lobe.
3. Oblique fissure.
4. Cardiac notch.
5. Lingula.

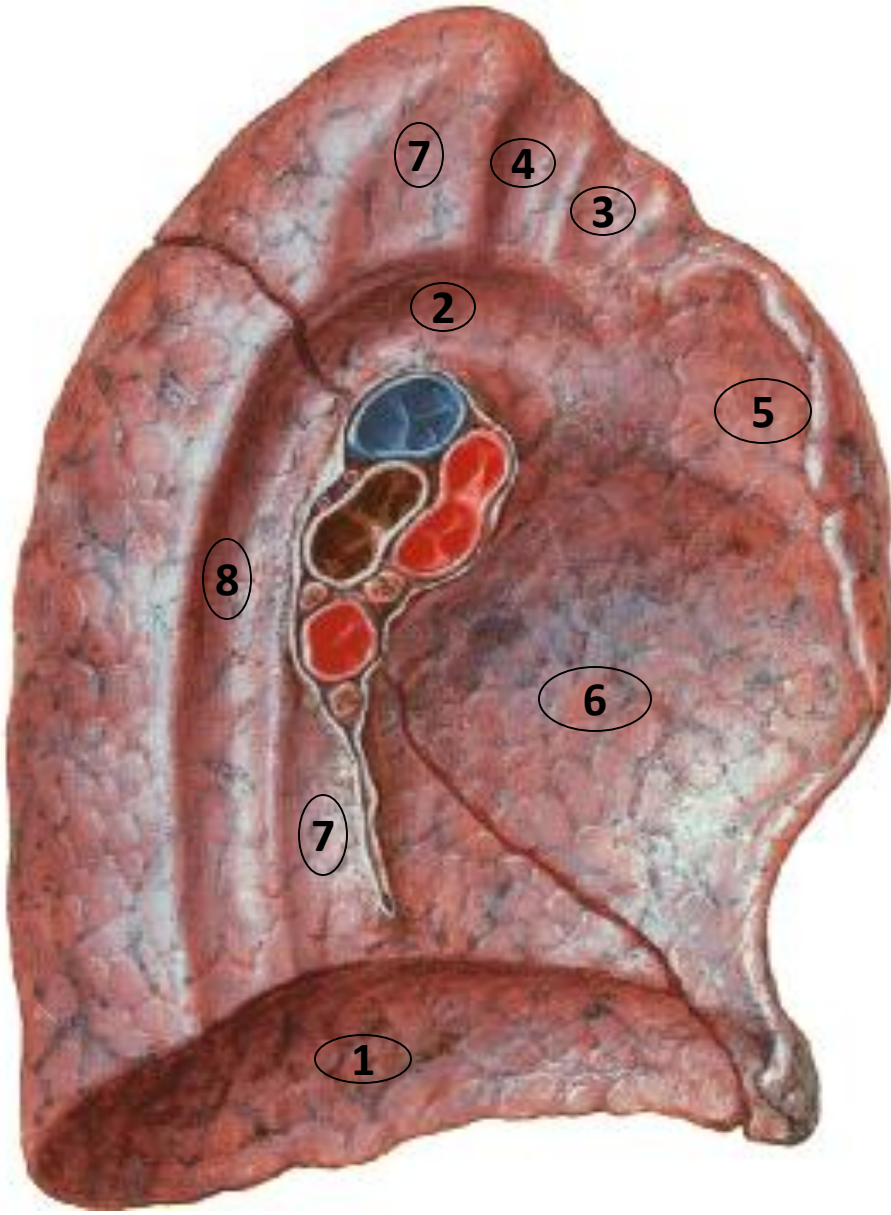
* Costal surface is related to:

1. Costal pleura.
2. Thoracic wall.



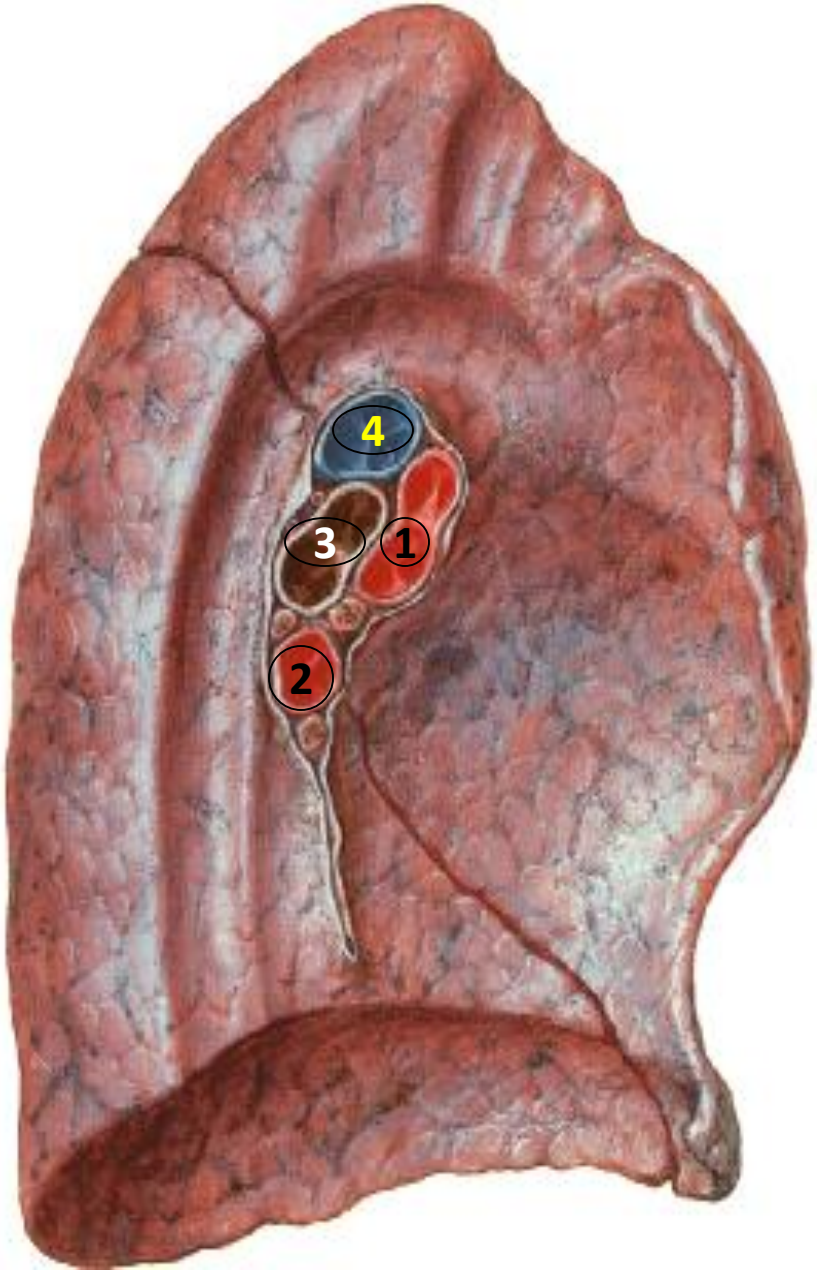
Medial surface

1. Base → Related to Left cupola of diaphragm.
2. Arch of aorta.
3. Left common carotid artery.
4. Left subclavian artery.
5. Pulmonary trunk & Thymus.
6. Left ventricle.
7. Esophagus.
8. Descending thoracic aorta.



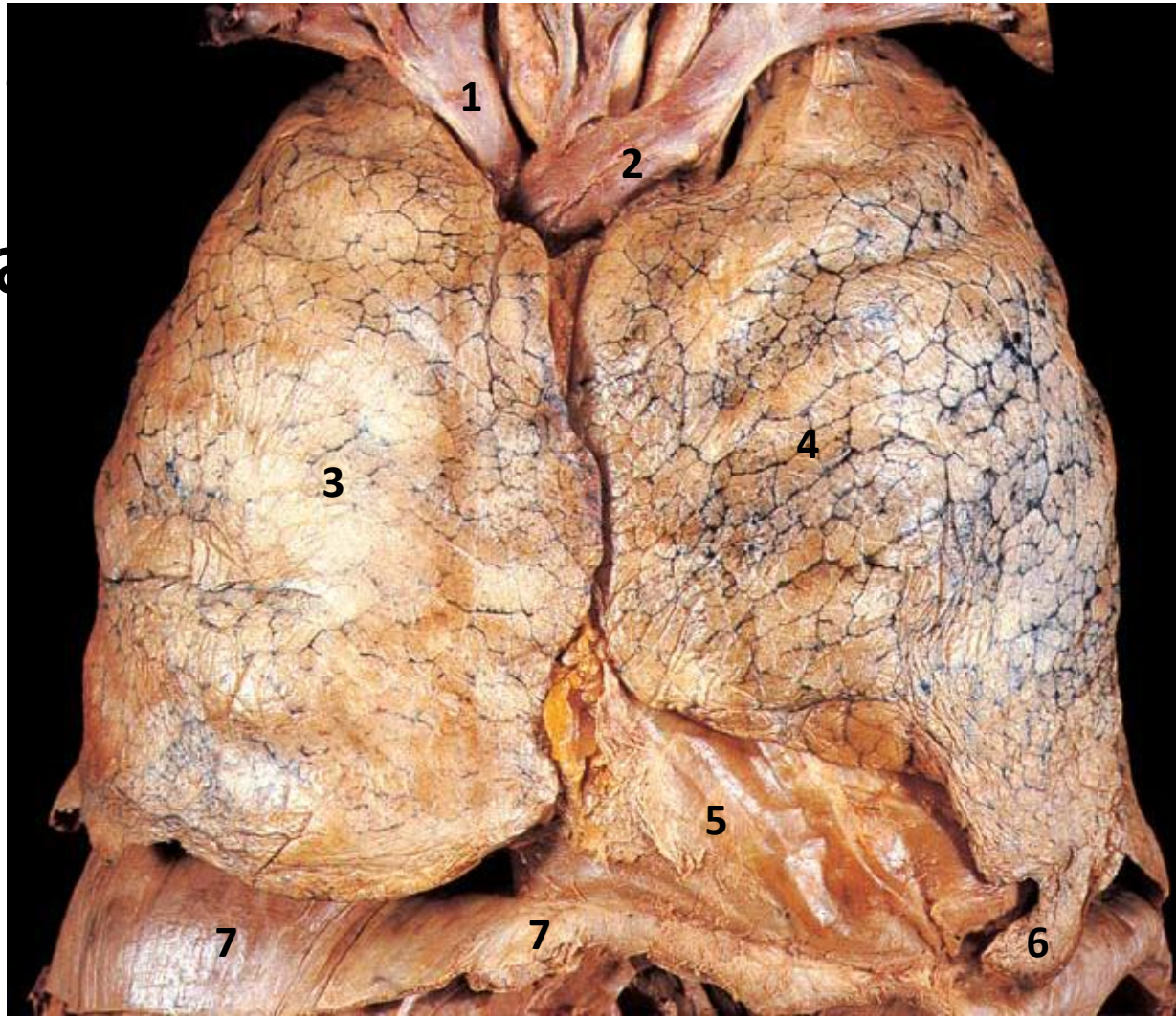
Hilum

1. **Superior pulmonary vein →**
   Most anterior structure.
2. **Inferior pulmonary vein →**
   Most inferior structure.
3. **Left bronchus → Most posterior structure & have rigid wall.**
4. **Left pulmonary artery →**
   Anterosuperior to the left bronchus.



Identify:

1-Rt. Brachiocephalic V.
2-Lt. Brachiocephalic V.
3-Rt. Lung
4-Lt. Lung
5-Fibrous Pericardium
6-Lingula
7-Diaphragm



Identify:

-Apex of the lung (blue Arrow)
1-Upper lobe
2-Middle lobe
3-Lower lobe

Identify:

- **Apex of the right lung (red Arrow)**

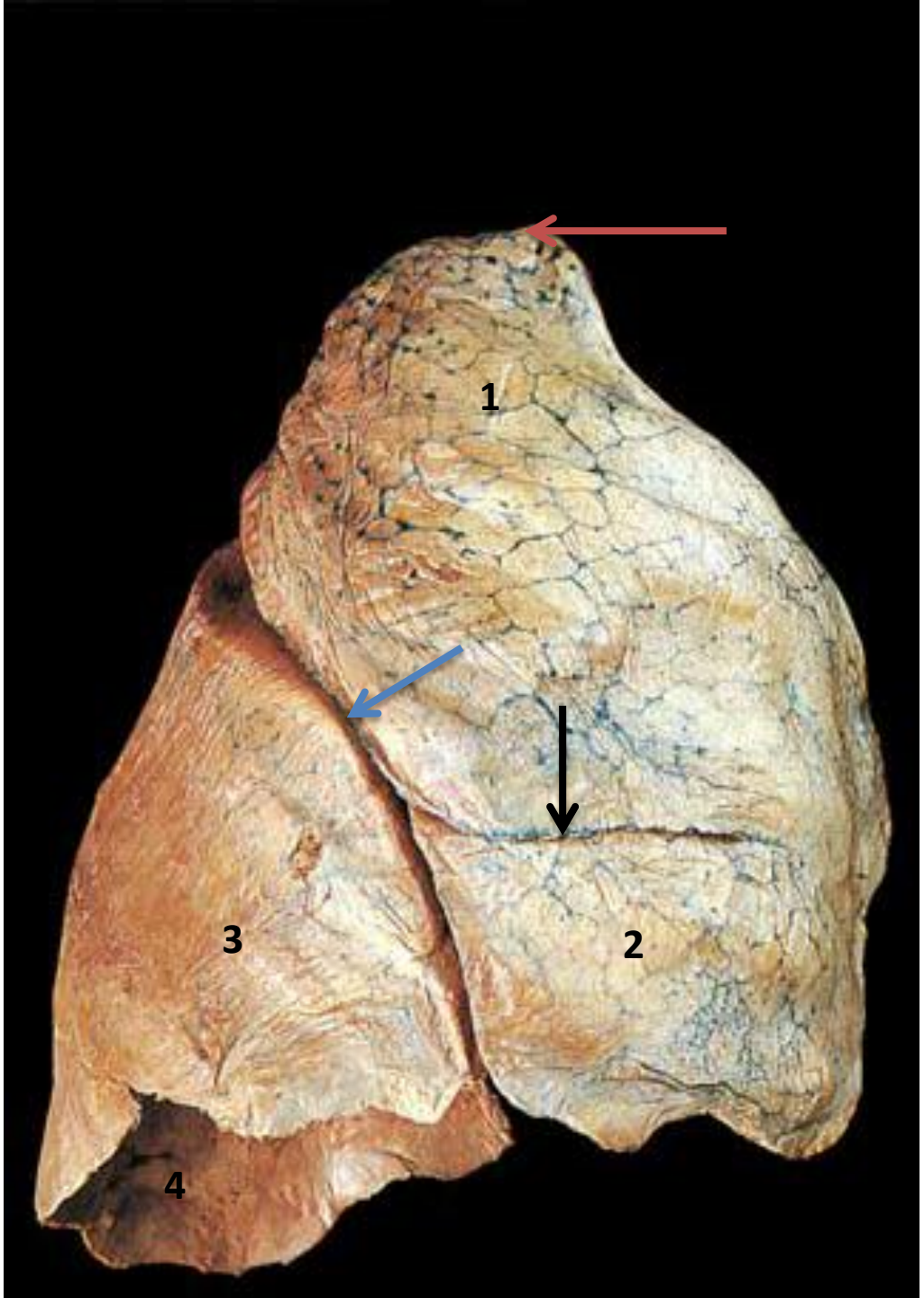
1-Upper lobe

2-Middle lobe

3-Lower lobe

- **Horizontal fissure (black Arrow)**
- **Oblique fissure (blue Arrow)**

4-Base of the lung (Diaphragmatic surface).



Identify:

- **Apex of the left lung (red Arrow)**

1-Upper lobe

2-Lower lobe

- **Oblique fissure (black arrow)**
- **Cardiac notch(blue arrow)**

3-Lingula

Identify:

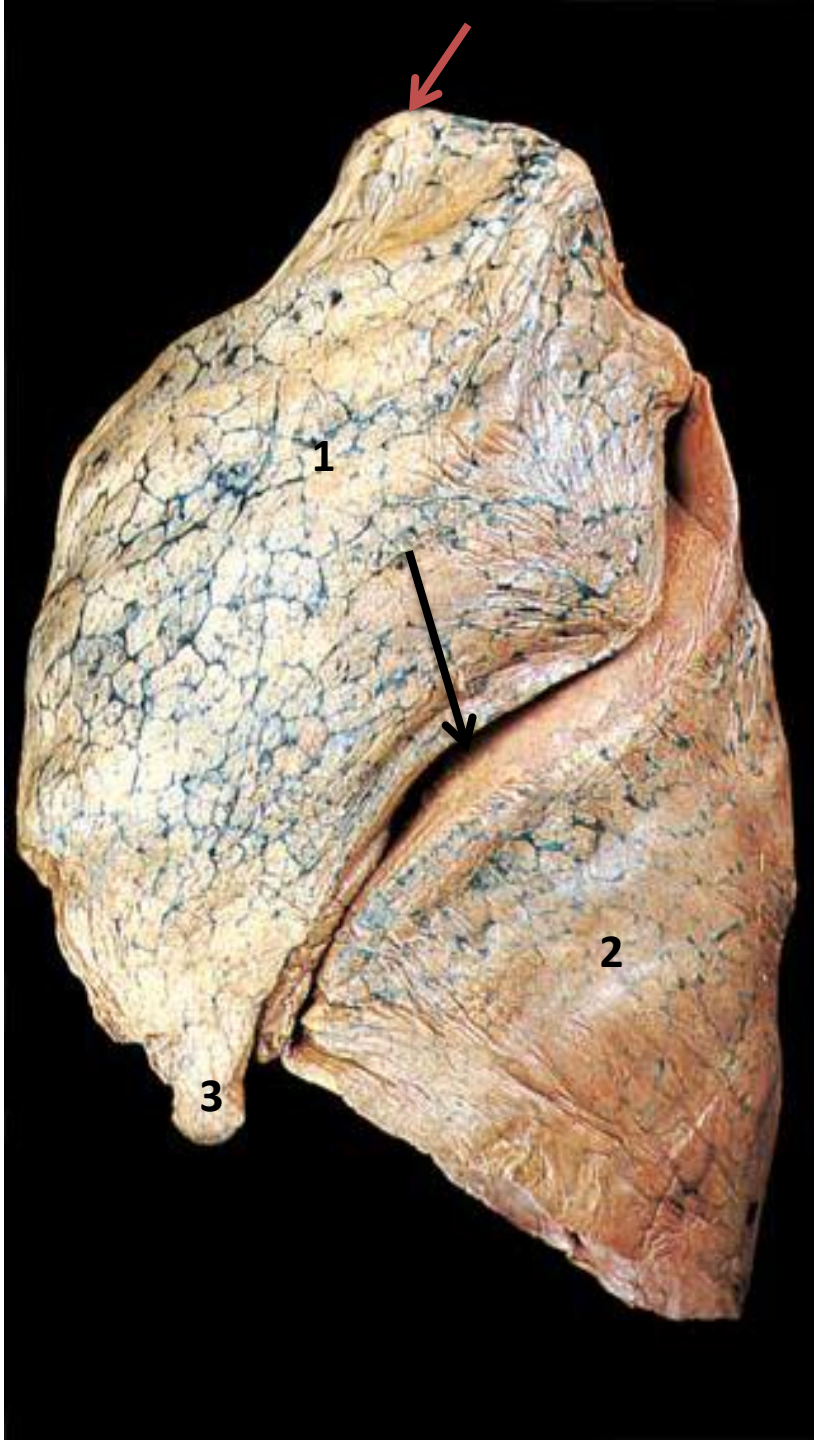
- **Apex of the left lung (red arrow)**

1-Upper lobe

2-Lower lobe

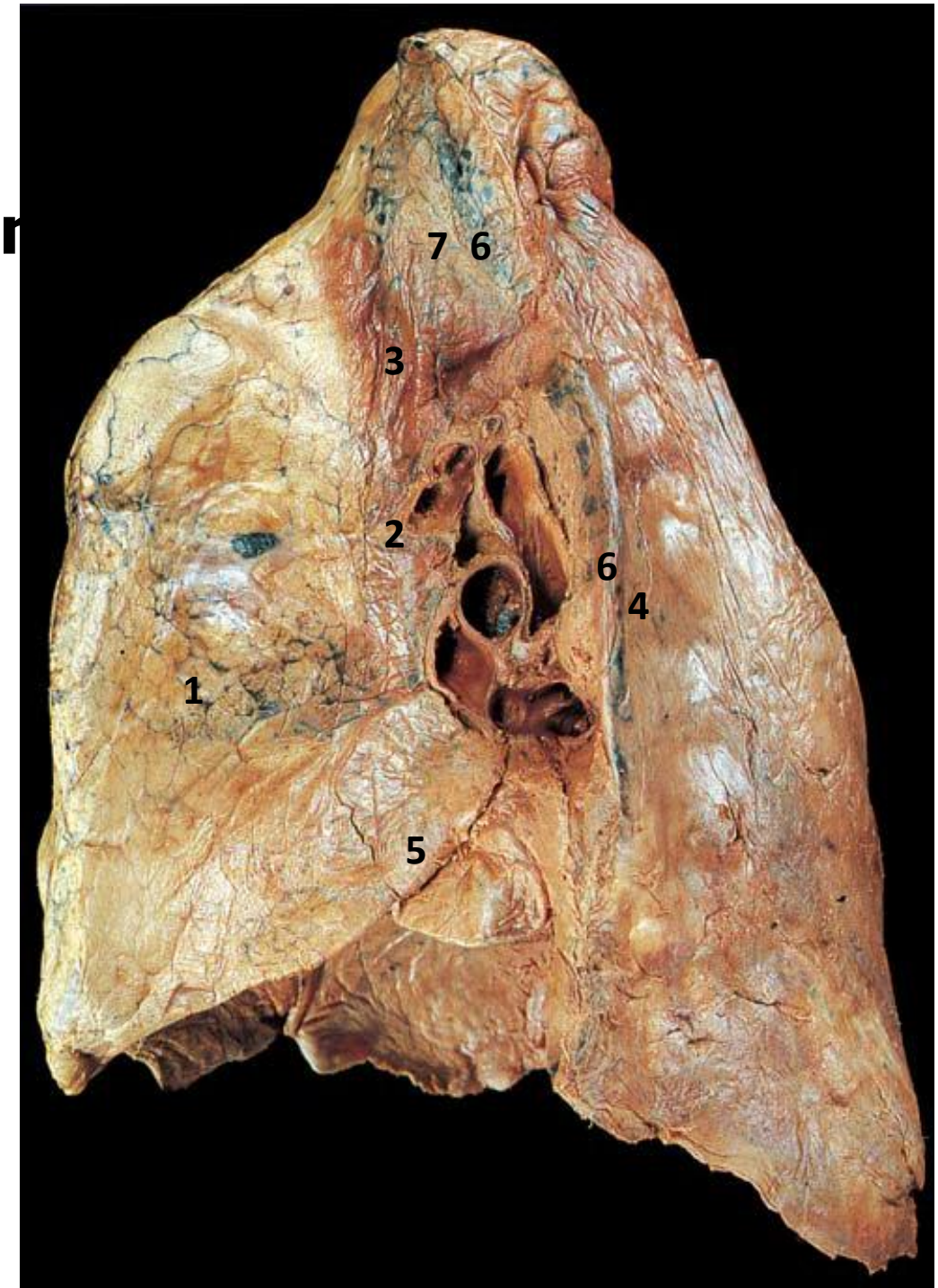
- **Oblique fissure (black arrow)**

3-Lingula



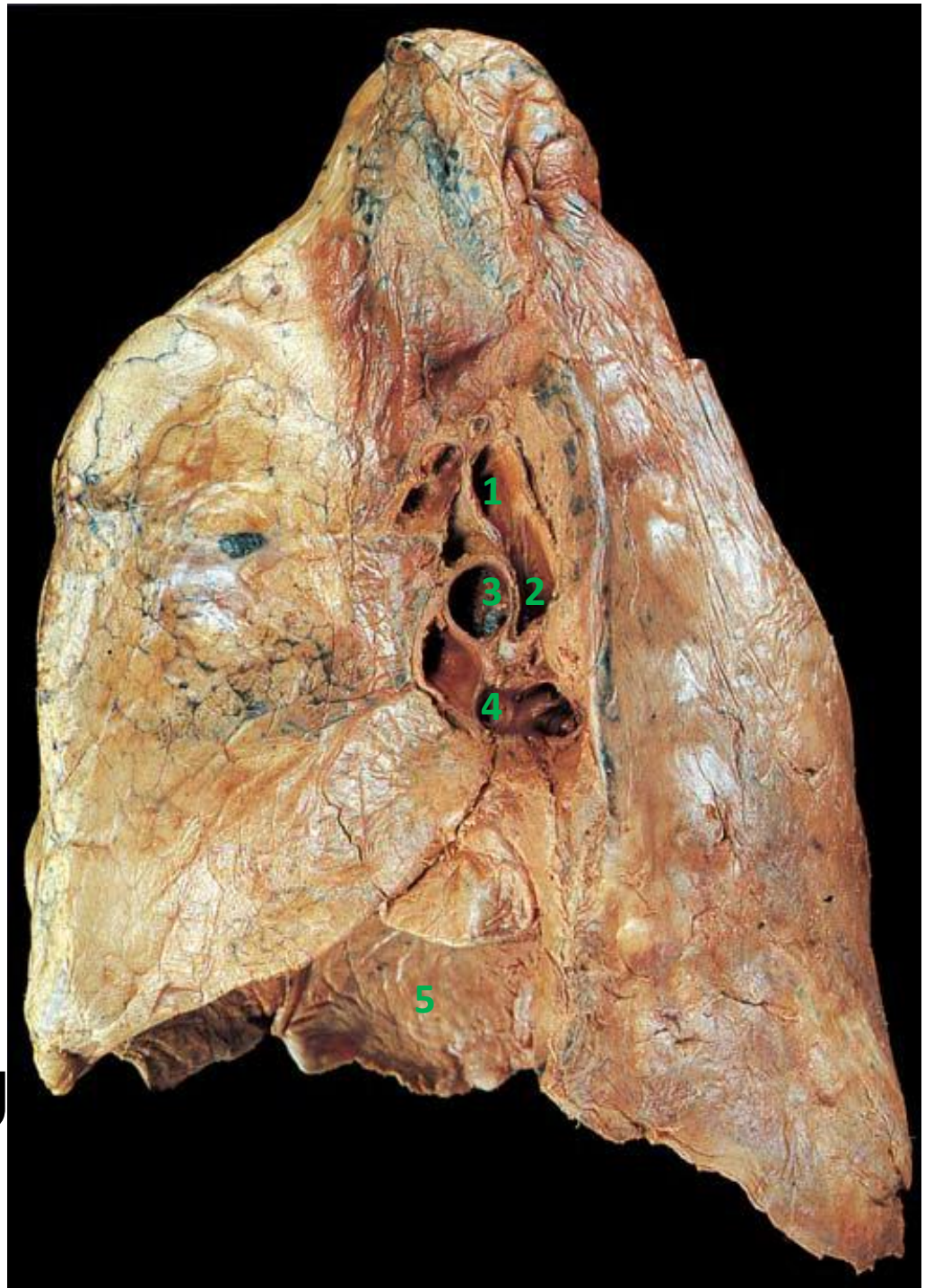
Identify:

1-Rt. atrium impression
2-SVC impression
3-Rt. Brachiocephalic vein impression
4-Azygos vein impression
5-IVC impression
6-Esophageal impression
7-Tracheal impression



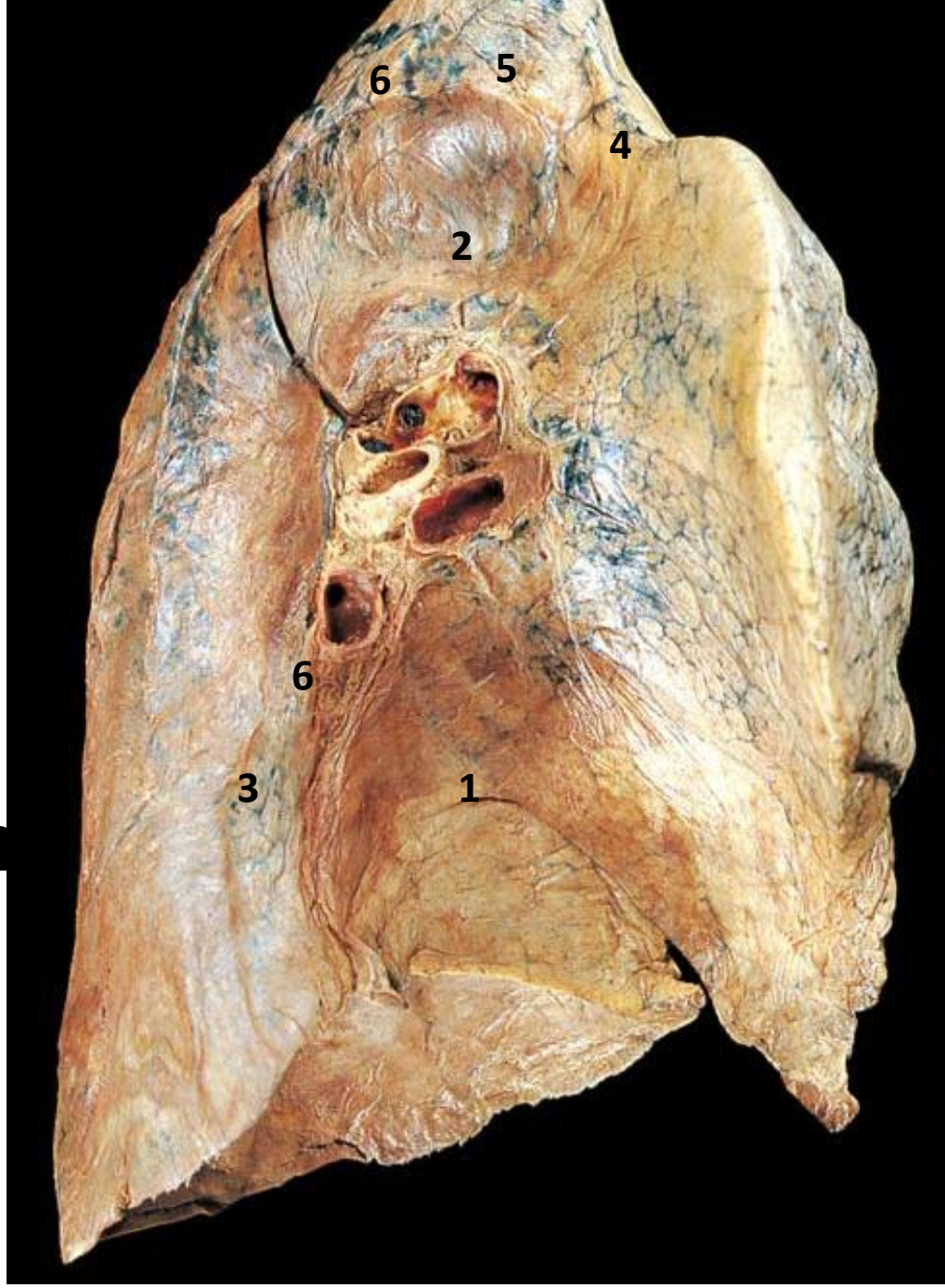
Identify:

1-Eparterial bronchus
2-Hiparterial bronchus
3-Right Pulmonary artery
4-right Pulmonary veins
5-Diaphragmatic surface of right lung



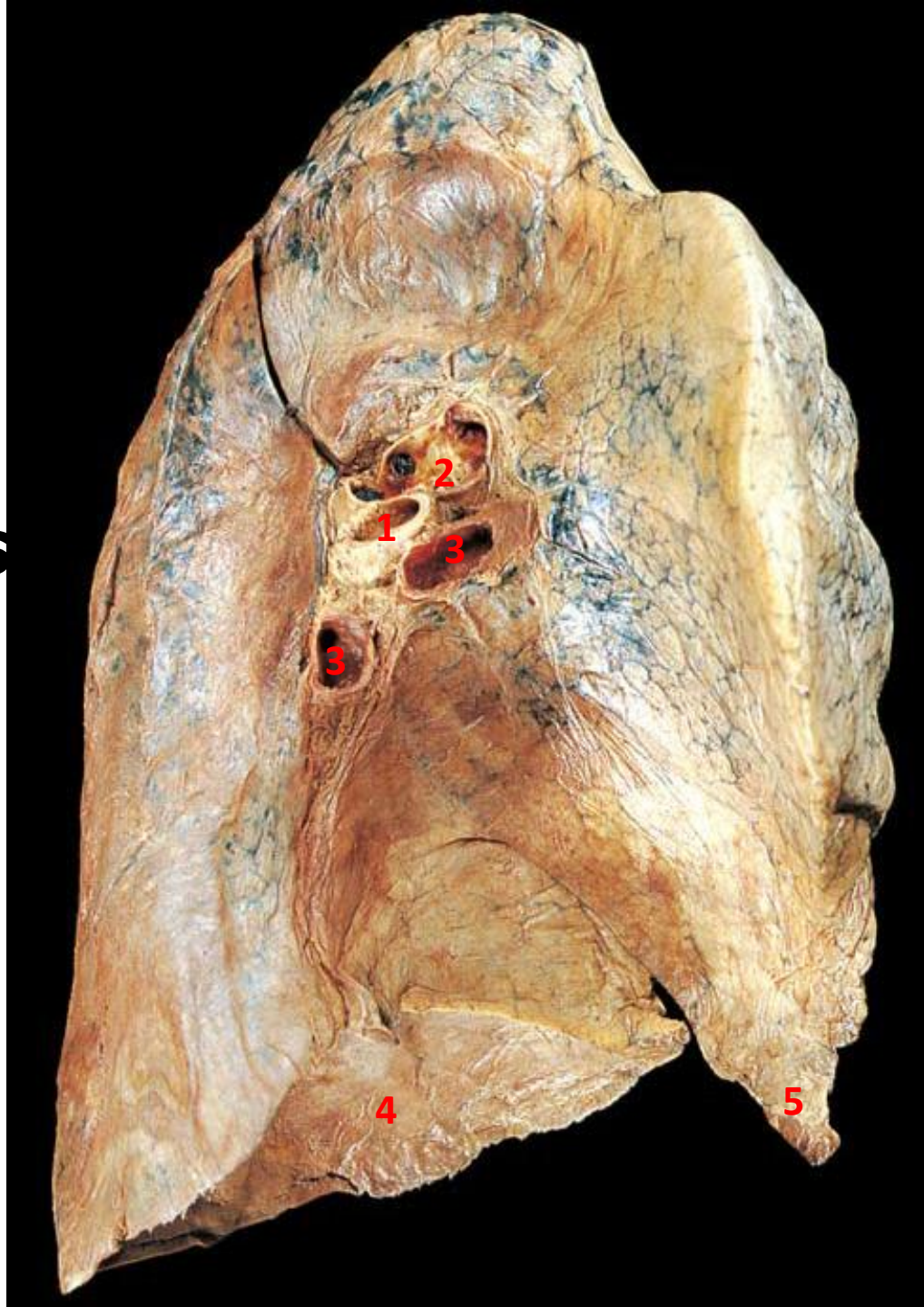
Identify:

1-Left ventricle impression
2-Aortic arch impression
3-Thoracic aorta impression
4-Lt. CCA impression
5-Lt. Subclavian artery impression
6-Esophageal impression



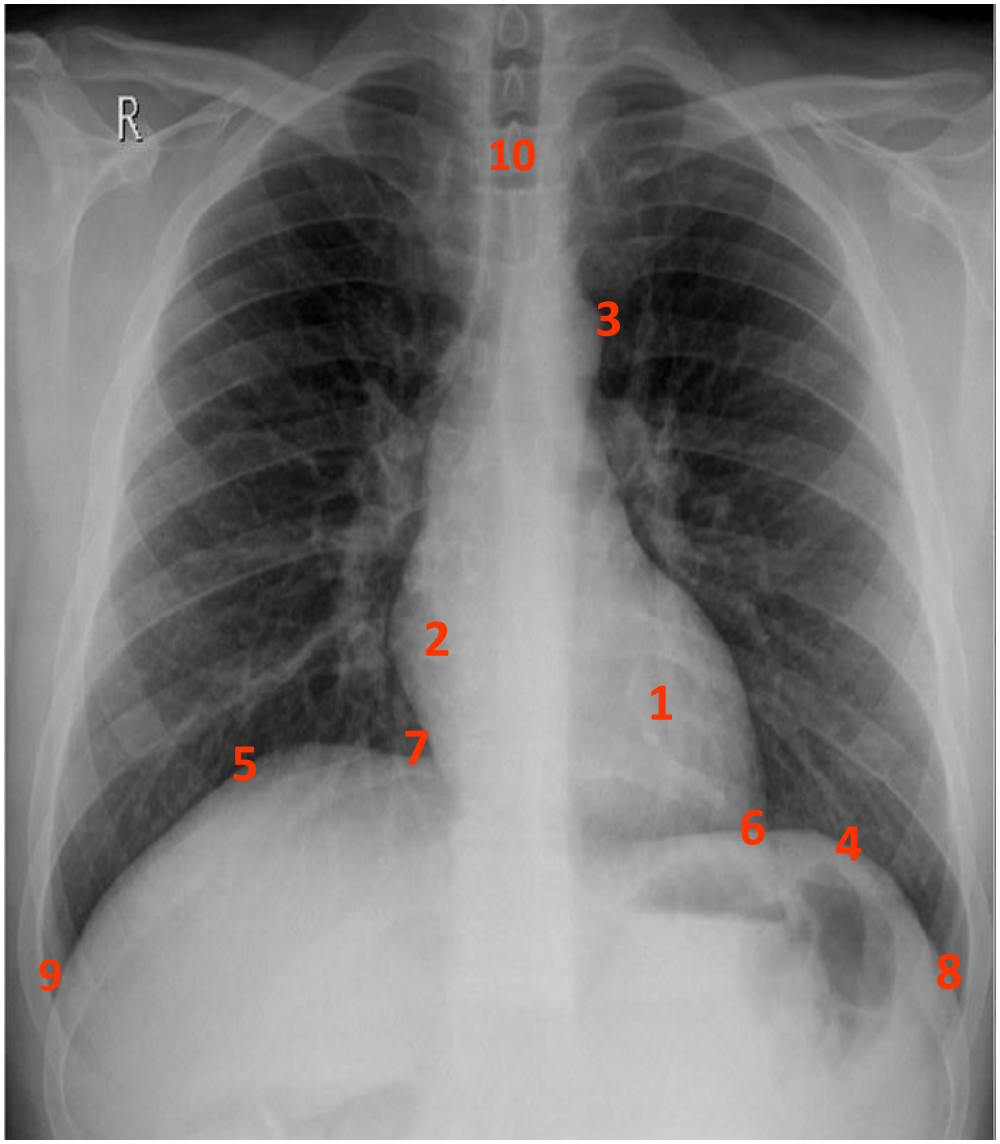
Identify:

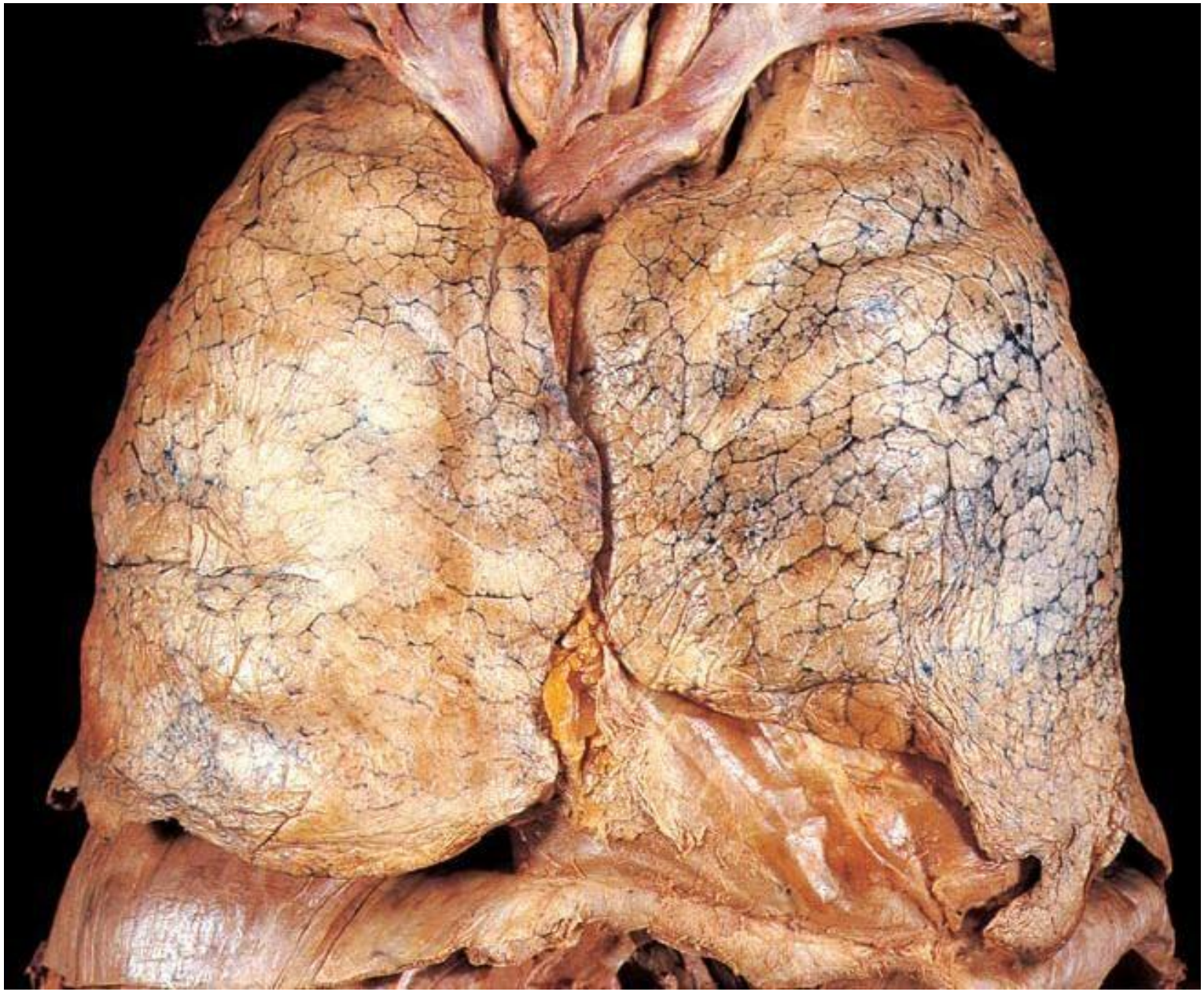
1-Lt. Main bronchus
2-Lt Pulmonary artery
3-LtPulmonary veins
4-Diaphragmatic surface of left lung
5-Lingula



Soft tissues:

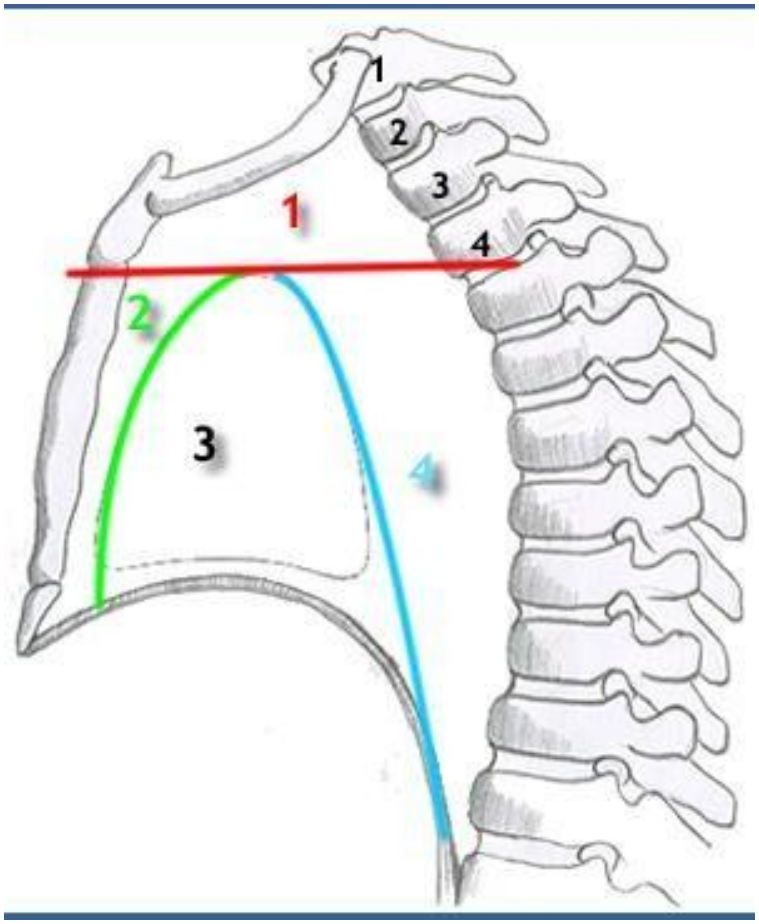
1. Left ventricle (left border of the heart).
2. Right atrium (right border of the heart).
3. Aortic knuckle (arch of aorta).
4. Left cupola of diaphragm.
5. Right cupola of diaphragm.
6. Left cardio-phrenic angle.
7. Right cardio-phrenic angle.
8. Left costo-phrenic angle.
9. Right costo-phrenic angle.
10. Tracheal shadow.





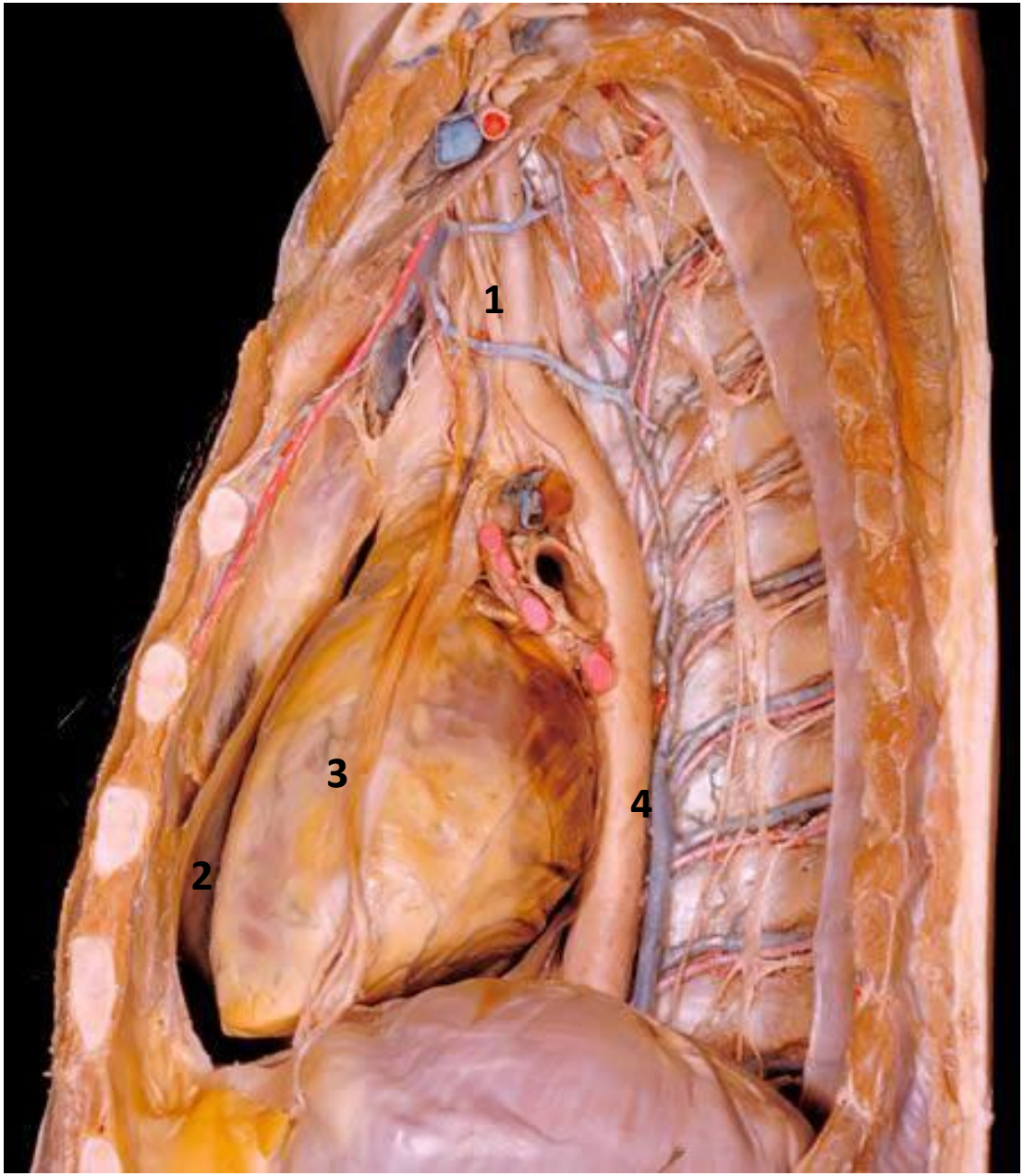
Identify:

- **(1)Superior Mediastinum**
- **(2,3,4)Inferior Mediastinum**
- **(2)Anterior Mediastinum**
- **(3)Middle Mediastinum**
- **(4)Posterior Mediastinum**



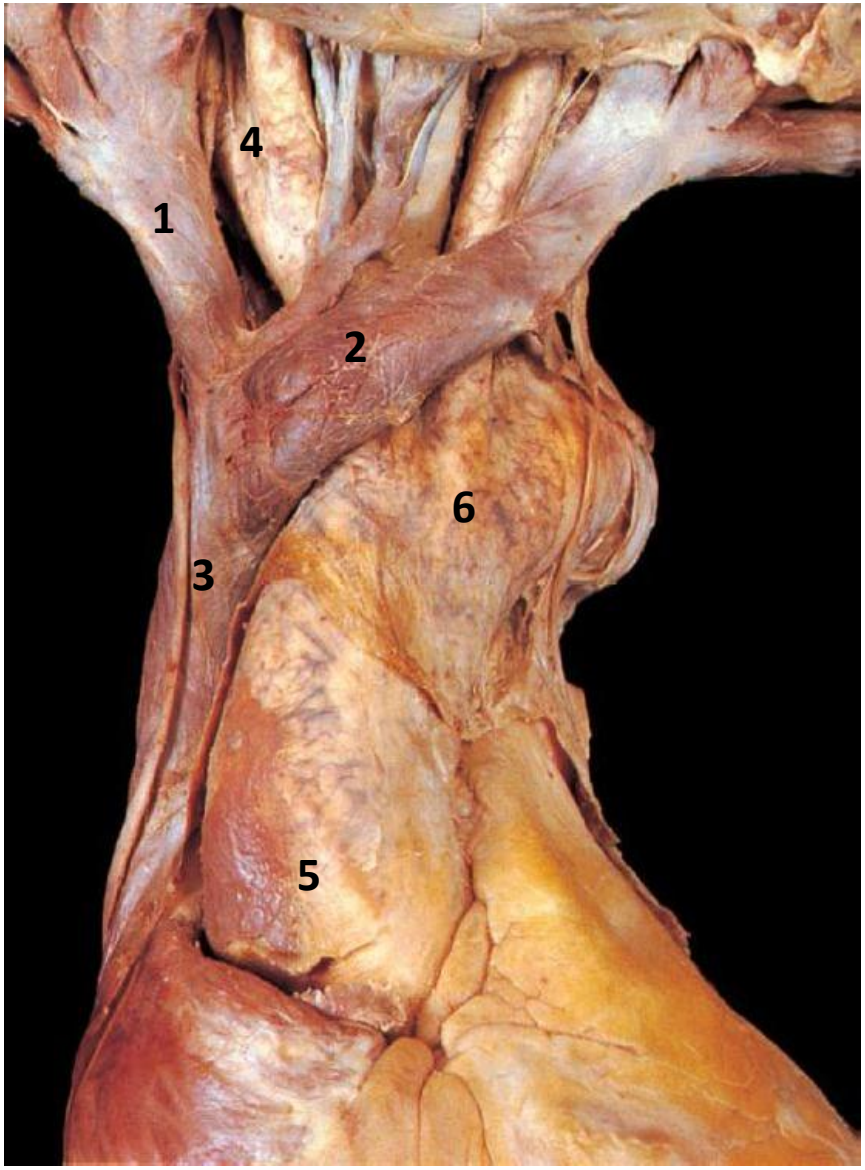
Identify:

1-Superior Mediastinum
2-Anterior Mediastinum
3-Middle Mediastinum
4-Posterior Mediastinum



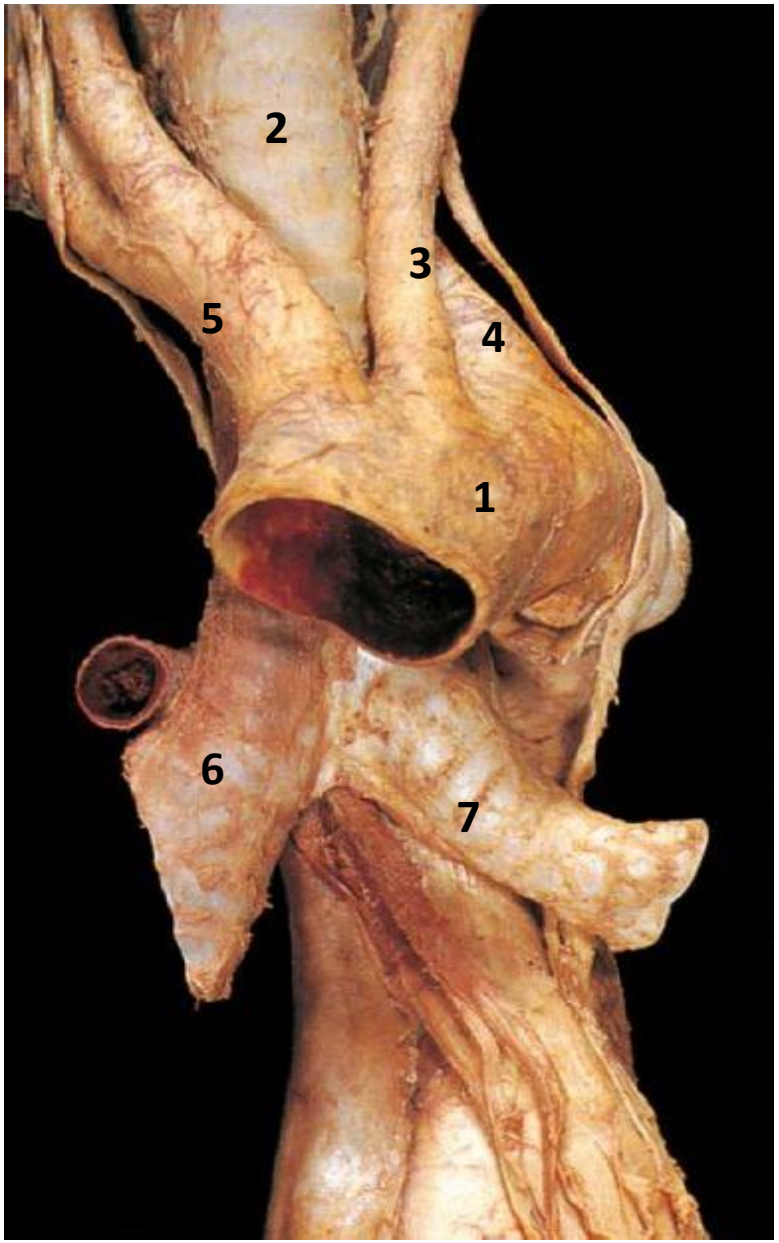
Identify:

1-Rt. Brachiocephalic vein
2- Lt. Brachiocephalic vein
3- SVC
4-Brachiocephalic artery
5-Ascending Aorta
6- Arch of Aorta



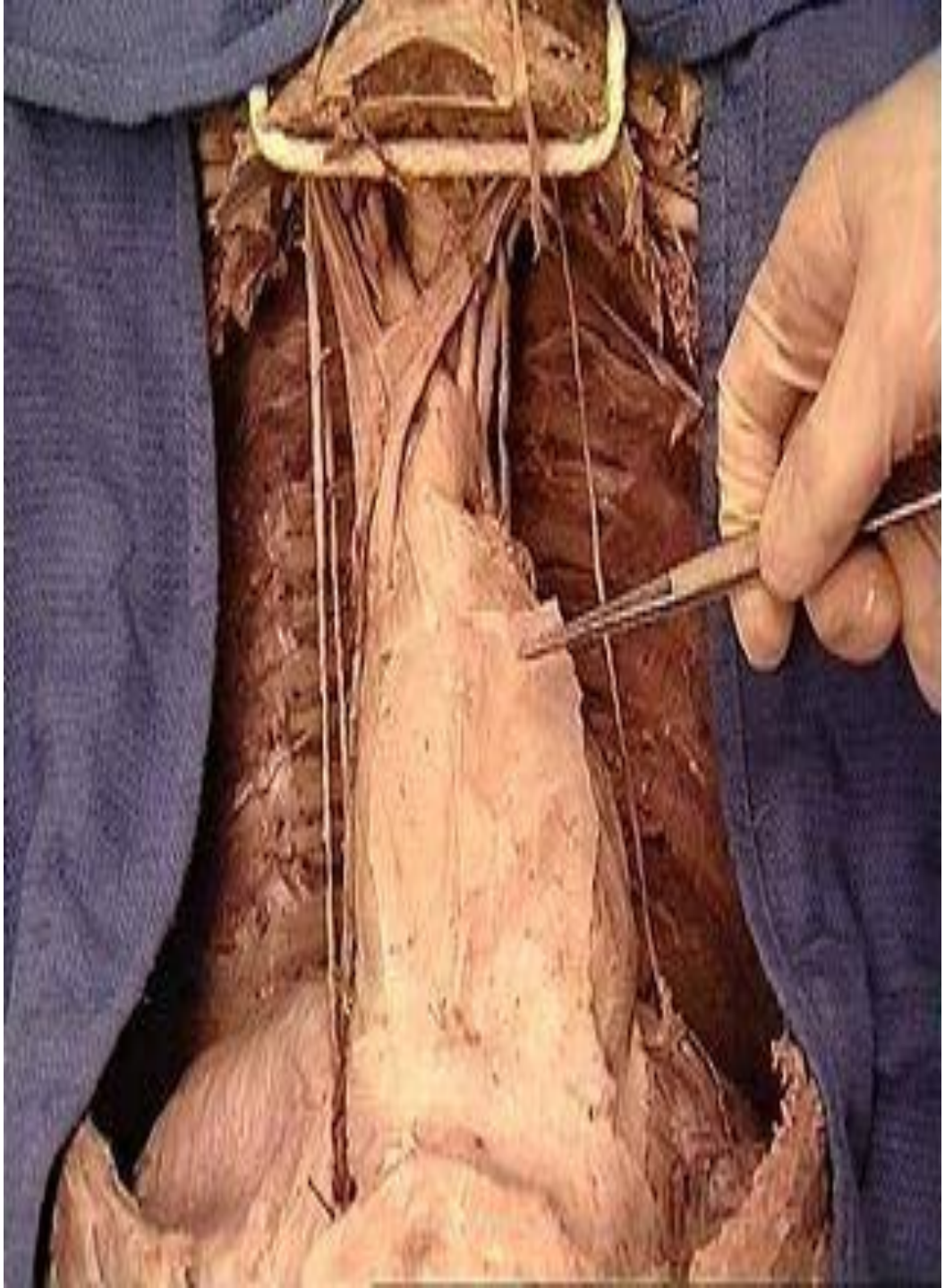
Identify:

1-Arch of Aorta
2-Trachea
3-Left common carotid artery
4-Left subclavian artery
5- brachiocephalic artery
6-Right main Bronchus
7- Left. main bronchus



Identify:

- **Rt. & Lt. Brachiocephalic V.**
- **SVC**



Identify:

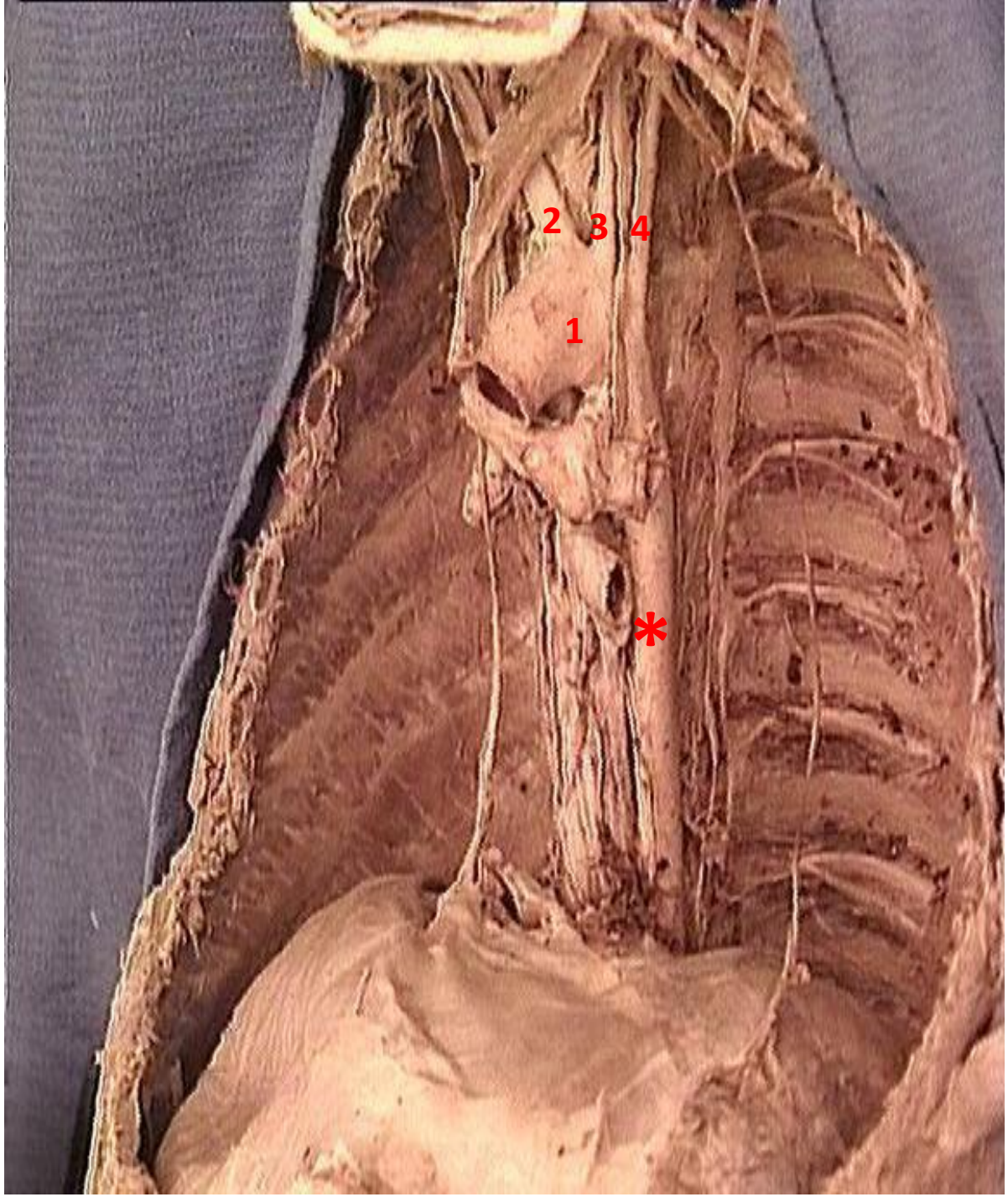
1-Arch of aorta

2-Brachiocephalic a

3-Lt CCA

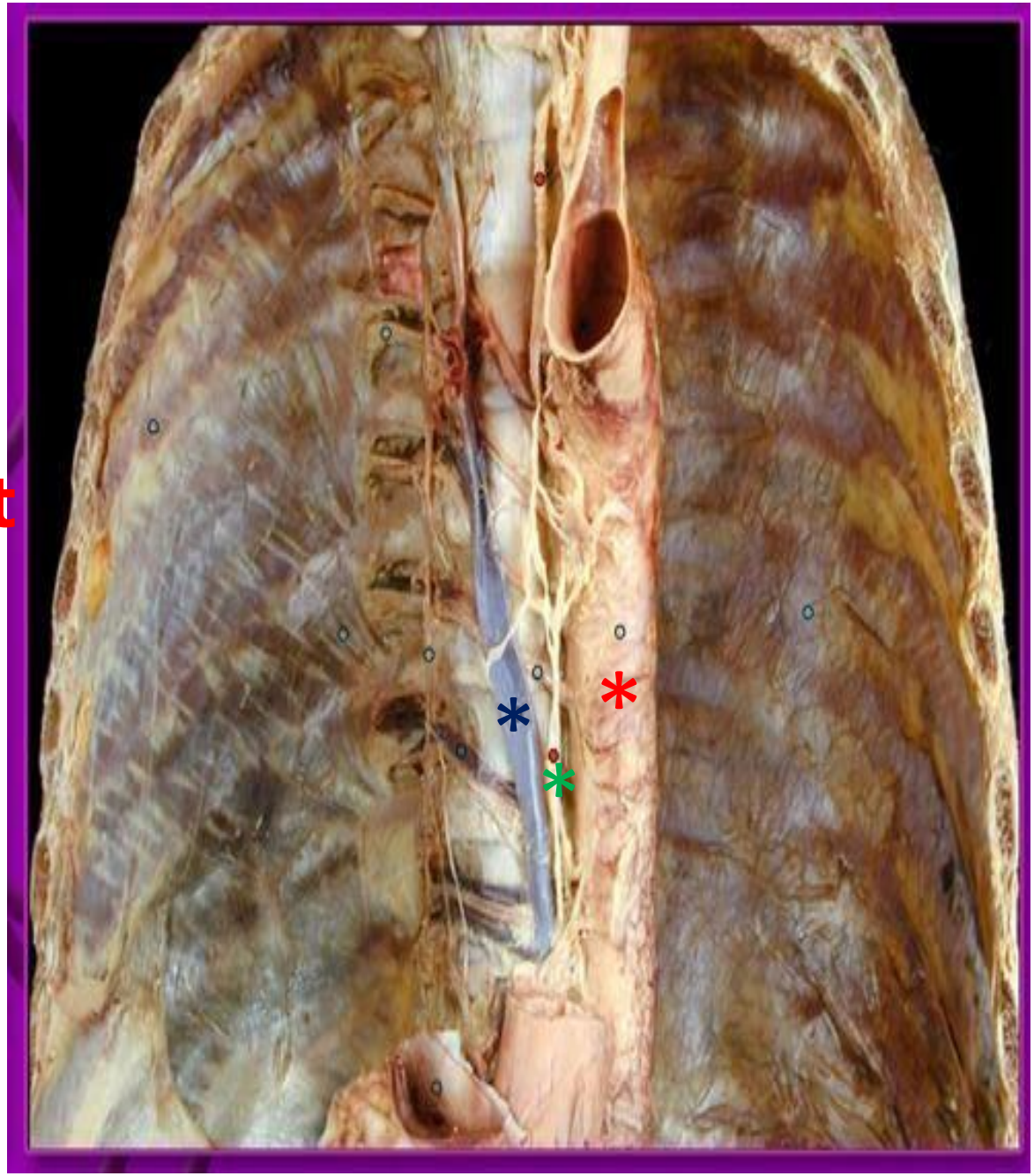
4-Lt subclavian A

***Descending Aorta**



Identify:

***Thoracic Aorta**
***Azygos vein**
***Thoracic duct**

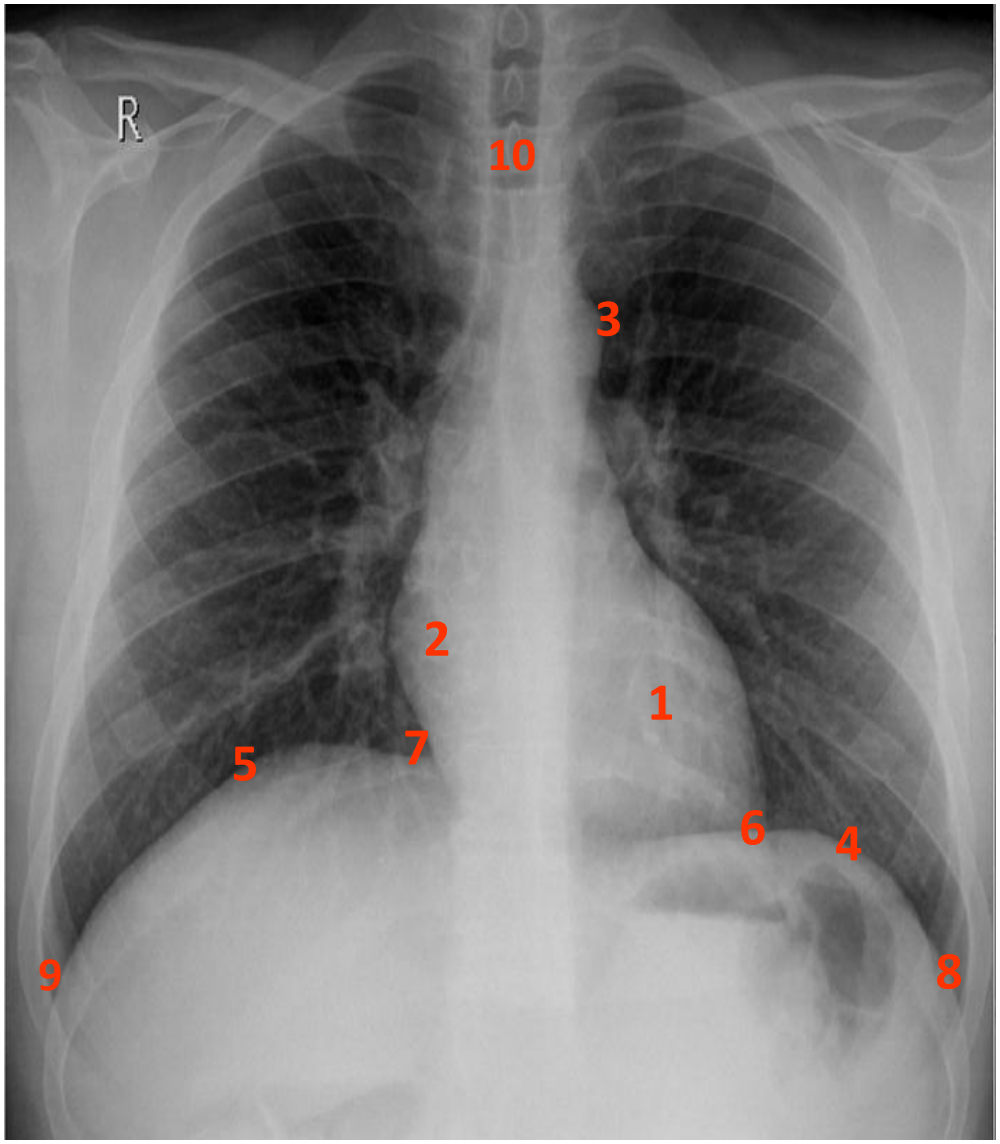


Identify:

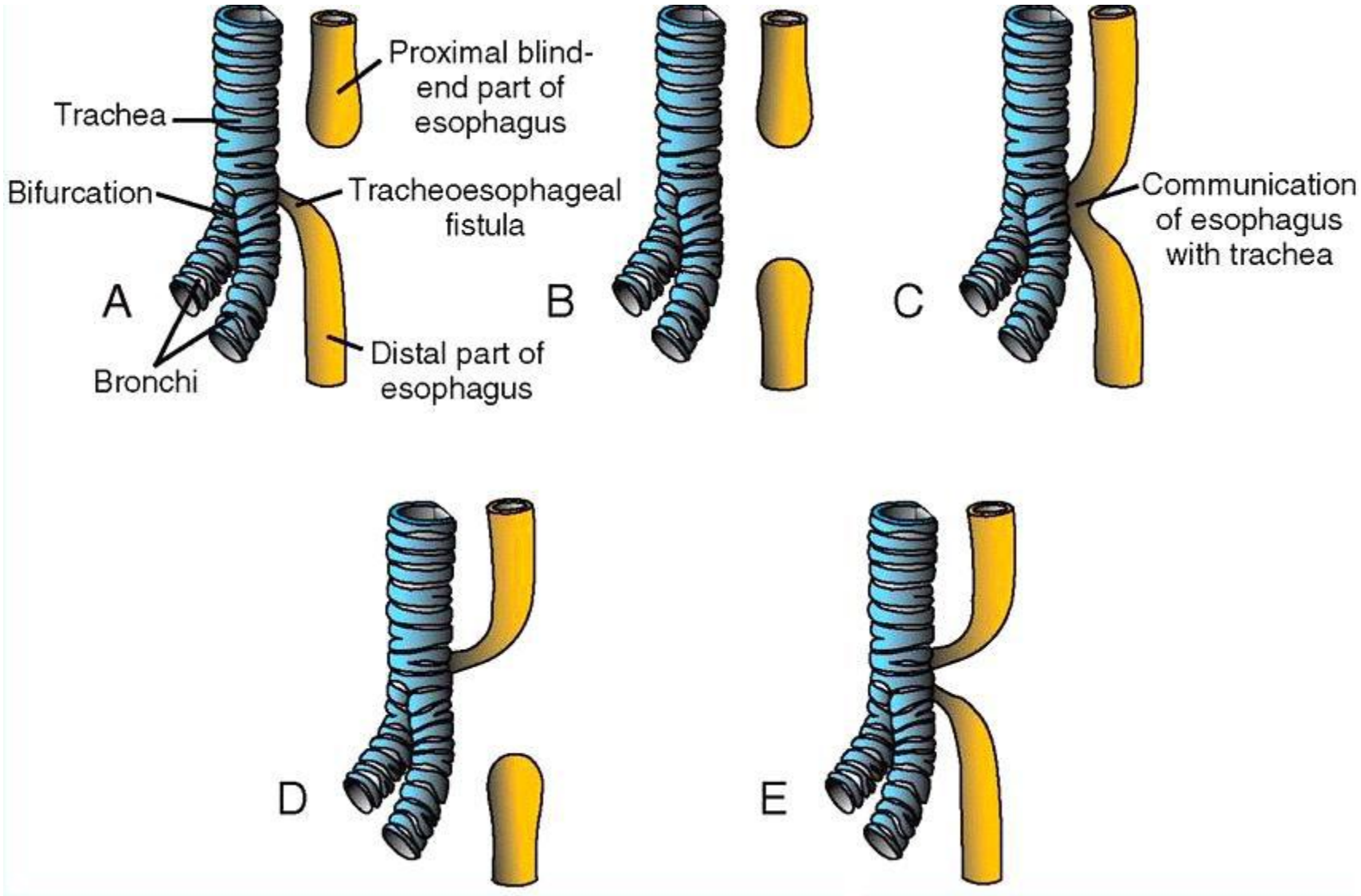
- Posterior intercostal VAN

Soft tissues:

1. Left ventricle (left border of the heart).
2. Right atrium (right border of the heart).
3. Aortic knuckle (arch of aorta).
4. Left cupola of diaphragm.
5. Right cupola of diaphragm.
6. Left cardio-phrenic angle.
7. Right cardio-phrenic angle.
8. Left costo-phrenic angle.
9. Right costo-phrenic angle.
10. Tracheal shadow.



Tracheo- esophageal fistula



Radiological picture of Tracheo-eosphageal fistula

“ Coiled Ryle tube”